

AI

AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

OCTOBER 1, 1951

In This Issue . . .

Berlin Automobile Show

Truck Torque Converter

Automotive-Aviation Section

New Time Saving Machines

Truck Torque Transmitters

Complete Table of Contents, Page 2

A C H I L T O N P U B L I C A T I O N



Cuts die polishing, puts more punch into production...

● Operators at Great Lakes Spring Division of Standard Steel Company, Chicago, were running only 5,000 to 10,000 automotive seat cushion track supports on this 200 ton press between shutdowns for polishing of the dies. Appraising the situation, a Standard Oil lubrication specialist recommended STANOSTAMP Compound "C" in place of the oil base compound then in use.

STANOSTAMP's superiority was shown without question when production mounted to 100,000 piece parts before dies required polishing.

These results . . . similar to the results you may expect from STANOSTAMP in your own plant . . . have led to the use of STANOSTAMP in a wide

STANORUST

REG. U. S. PAT. OFF.

Rust Preventives

range of punch press work at Great Lakes, replacing a variety of compounds. For the help of a Standard Oil lubrication specialist in solving your own press problem, contact your local Standard Oil office or write: Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

What's your problem?



A. I. Seabaugh, of Standard's Chicago office, is the lubrication specialist who helped solve this problem through the use of STANOSTAMP Compound. Like other Standard lubrication specialists, he makes his headquarters near the plants he serves and is able to give on-the-job help when it's needed.

Practical experience and extensive special training make up the background for the service these specialists offer. It is available to you, in your plant, wherever you are located in the Midwest. Just call your local Standard Oil office.

When the lubrication specialist calls, ask about these other fine Standard Oil products:

STANICUT Cutting Oils. These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades vary in viscosity and compounding. Each contains the correct proportion of extreme-pressure and friction-reducing ingredients.

STANICOOL HD Soluble Oil. Because of additional compounding, this heavy-duty soluble oil possesses the cooling ability of an emulsion and also gives better tool life and finer finishes than do conventional soluble oils.

STANOLEX Oils. Due to superior wetting ability, these oils are useful on bearings which are inclined to rust during shutdown, or because of high humidity. They are recommended for lubrication of ways and guides on machine tools which are prone to chatter when straight mineral oils are used.

STANDARD OIL COMPANY



(Indiana)

COTTA Reduction Unit converts new engine rpm to dragline speed



Like many other owners of heavy machinery needing replacement, operators of this quarry dragline found new equipment both costly and hard to get. They decided to rebuild, using a new diesel engine with COTTA Reduction Gears to convert the higher engine speed to the lower speed of the operating parts. Today the dragline is performing like a new machine, good for many years of rugged service. Have you a speed reduction problem we can help you solve . . . at a substantial saving?



Broad range of ratios
Input torque from 150 to
2000 foot pounds
For use on cranes, shovels, rock
crushers, generators, pumps, etc.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

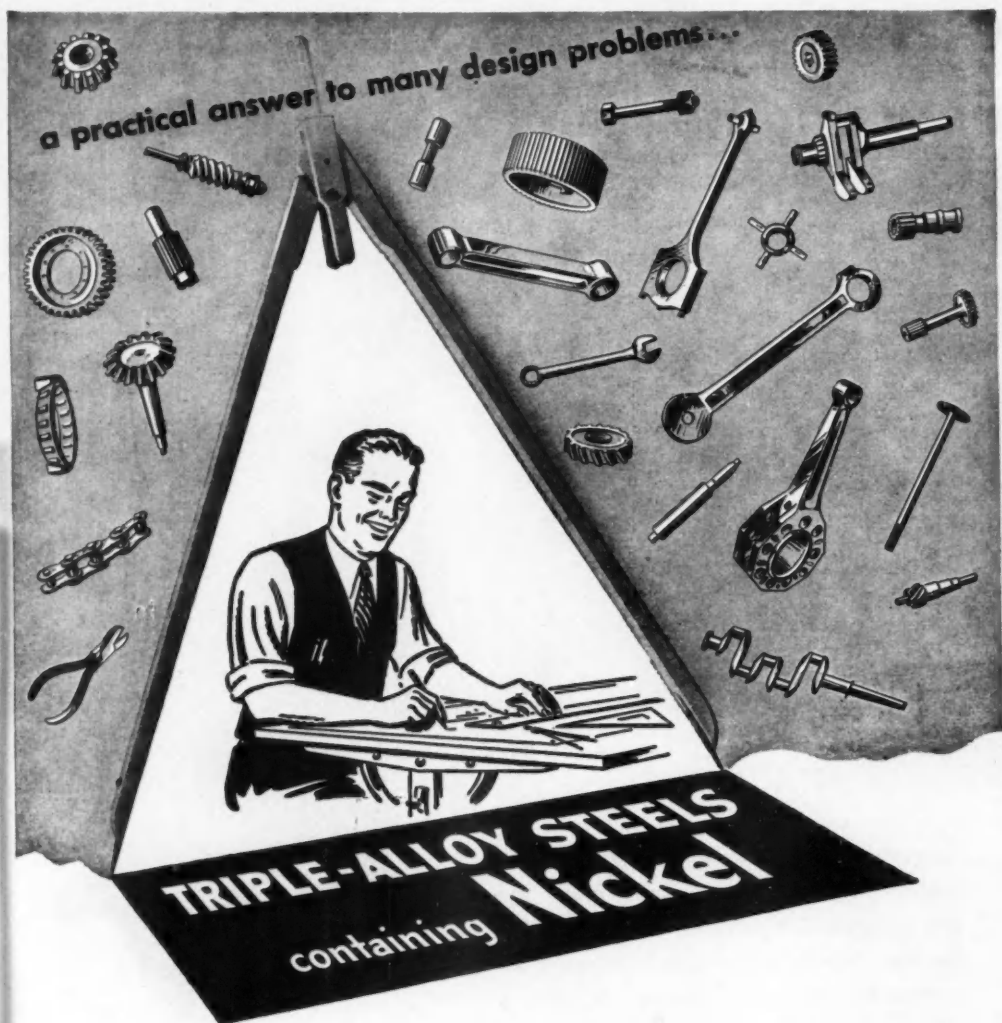
COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

**HEAVY-DUTY
REDUCTION UNITS**

"Engineered-to-order"



Triple-alloy steels containing nickel offer designers the following *triple* advantages:

1. **OUTSTANDING PERFORMANCE**—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.
2. **RELIABILITY**—based on consistently uniform response to heat treatment.
3. **ECONOMY**—resulting from standard compositions precisely graded to match the engineers' needs.

Service records established by triple-alloy steels over a period of years show that they are giving excellent results in many diverse and exacting applications.

The many standard combinations available permit accurate and economic selection for specific uses.

Because of their many advantages, these triple-alloy steels warrant your careful consideration when planning new or improved designs. We shall be glad to furnish counsel and data upon request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street
New York 5, N. Y.

AUTOMOTIVE INDUSTRIES

October 1, 1951

Published Semi-Monthly

Vol. 105, No. 7

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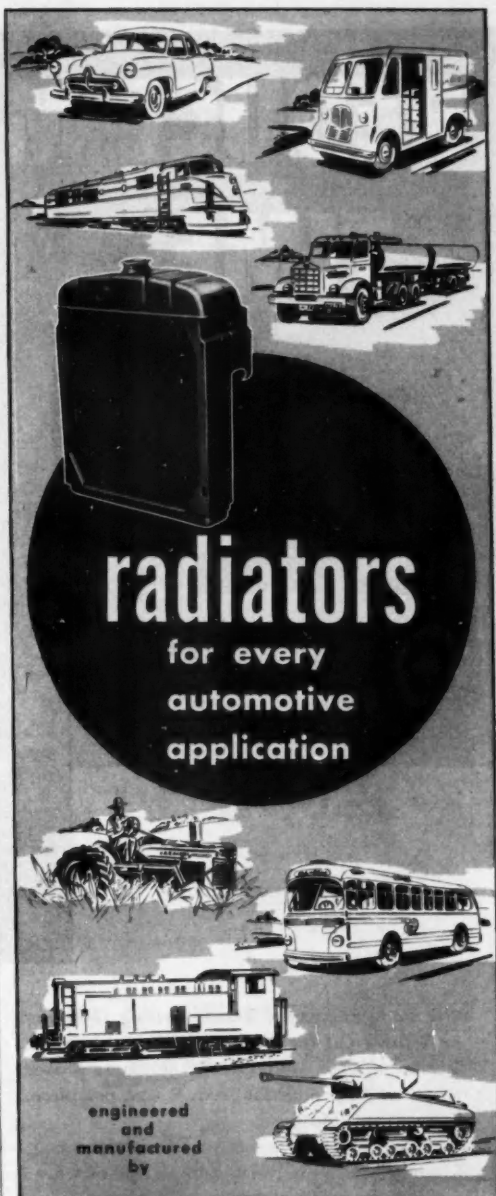
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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), May, 1952; Dealer and Repairman (monthly), October, 1952; the Automobile Magazine (monthly), July, 1957, and the Horizons Age (weekly), founded in 1928, Mar. 1938.

AUTOMOTIVE INDUSTRIES, Vol. 105, No. 7, Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1935, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year \$2.00, 2 years \$3.00. Canadian and Foreign \$5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 1950), \$1.00. AUTOMOTIVE INDUSTRIES, October 1, 1951



radiators
for every
automotive
application

engineered
and
manufactured
by

YOUNG

HEAT TRANSFER PRODUCTS FOR
AUTOMOTIVE AND INDUSTRIAL
APPLICATIONS.

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CONDITIONING PRODUCTS FOR
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Dept. 101-K • RACINE, WISCONSIN
Factories at Racine, Wisconsin, and Mattoon, Illinois

REDUCE MACHINING TIME



Use the recommended *Texaco Cutting, Grinding or Soluble Oil* for your machining operations. The experience of thousands of plants proves you'll speed production, reduce cost per piece, and improve finish.

Texaco cutting fluids assure: faster operation, fewer rejects, more cuts per tool grind or wheel dressing. Regardless of the metal or your method of machining it, *Texaco Cutting, Grinding and*

Soluble Oils can help you do *all* your jobs better, faster and at lower cost.

Let a Texaco Lubrication Engineer specializing in machining help you select the proper Texaco cutting fluids for your particular work. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

VISIT THE TEXACO EXHIBIT AT THE METALS SHOW • BOOTH C-103 • DETROIT, OCTOBER 15-19



TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

Automatic joint snugness . . . anti-back-bend . . . anti-whip . . .

YOU GET THEM ALL

... with the world's finest
timing chain from the
world's largest
chain plant

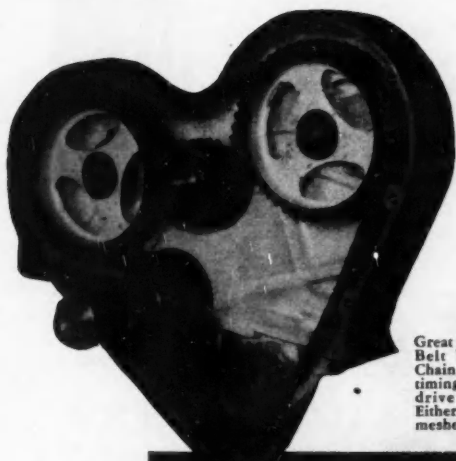


Today every designer is on the spot. More than ever, he has to be sure he's getting the best components for his engine. And he also has to be sure the source is dependable.

That's why Link-Belt Timing Chains and Sprockets are your best bet. It's the highest load-carrying chain on the market. Yet designs for some leading manufacturers measure only $1\frac{1}{16}$ inches in width! This narrower design will save valuable space in your engine.

More—the tremendous facilities of the new Link-Belt plant are your assurance of a continuing supply. Here high-level research is constantly in progress . . . to keep you out in front with the latest technical developments.

Let our engineers cooperate in the proving of your latest engine. We will gladly supply a test drive to your specifications. Details are in engineering catalog No. 2065.



Great flexibility of Link-Belt Duplex Timing Chain is exploited for timing and fuel pump drive on this engine. Either face of the chain meshes with wheels.

12,300

WHY SEGMENTAL BUSHINGS MEAN BETTER PERFORMANCE FOR YOUR ENGINE



Removable case-hardened segmental liners or bushings extend across entire chain width—double bearing surface . . . halve bearing pressure on joint

Broached holes in links form lock grip for bushings

Smooth, case-hardened pin, free to rotate between segmental bushings, presents every part of surface for wear

Bushing takes wear at joint—elongation of link hole or eye is negligible

AUTOMATIC JOINT SNUGNESS

Segmental bushings are made with slight bow

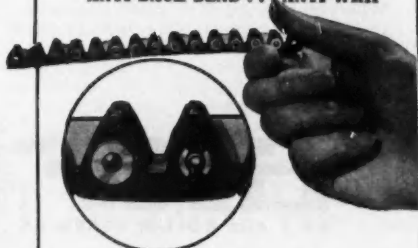


After initial assembly in chain, bushings are straight



Bow in bushing acts to keep a snug joint, maintaining chain pitch

ANTI-BACK-BEND . . . ANTI-WHIP



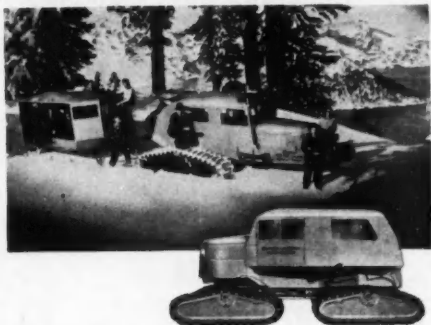
Built-in check in joint limits bushing rotation, checks back-bend and whip

LINK-BELT COMPANY: 220 South Belmont,
Indianapolis 6, Ind. Offices in principal cities.



SKF-equipped Mack Manufacturing Corporation LF Chassis.

SKF-equipped Tucker Sno-Cat Corporation Model 443 "Sno-Cat."



why do so many prefer SKF?

It's pretty hard *not* to buy good bearings today, but SKF is the preferred bearing with many an automotive manufacturer.

There are good reasons why!

These manufacturers know SKF as a reliable, friendly supplier. They've learned to have implicit confidence in the experienced bearing engineering specialists at SKF's headquarters. They appreciate the teamwork of SKF field men who are qualified specialists in the application of bearings to vehicles.

Their customers know the value of the complete maintenance service available to them through SKF's Distributor Organization.

Whatever your product, your engineers and designers can have this helpful SKF teamwork simply by asking for it.

7287

SKF-equipped White Motor Company Super Power Truck.



SKF-equipped Hyster Company "40" Lift Truck.



SKF

BALL AND ROLLER BEARINGS



WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity • craftsmanship • metallurgy
tolerance control • surface finish
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SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.—manufacturers of SKF and HESS-BRIGHT bearings.

(Advertisement)

Cork-and-Rubber Gasket Materials made to meet government specifications

There is an Armstrong material made to meet each of the 6 types included in the principal government specification covering cork-and-rubber gasket materials. These materials are listed below.

Government Specification	Armstrong Material
MIL-G-183 Type I Soft.....	NC-709
Type I Medium.....	NC-710
Type I Firm.....	NC-711
Type II Soft.....	DC-167
Type II Medium.....	DC-100
Type II Firm.....	DC-113
MIL-T-6841	(DK-153 RK-3045)
MIL-T-6747	DK-149

For detailed information about these compositions and their application, please see Sweet's file for product designers or call your Armstrong representative. You can reach him at the nearest Armstrong Industrial Division office listed below.

New cork-and-rubber compounds. Armstrong's Research Laboratories are ready to develop cork-and-rubber materials to meet new military requirements as they arise. Please discuss your needs with your nearest Armstrong representative . . . or write.

Cork compositions. There is an Armstrong Cork Composition made to meet each of the classes under Federal Specification HH-C-576, as well as

the requirements of each of the grades under specification MIL-C-16090.

Synthetic rubber compounds. Armstrong manufactures highly specialized synthetic rubber compounds for certain critical applications. For example, Armstrong makes a rubber washer that meets the requirements of the aircraft fuel nozzles made under MIL-N-4180.

Send for this gasket manual

You'll find up-to-date information on current government specifications and tentative SAE-ASTM specifications in "Armstrong's Gasket Materials."

You'll find, too, in this 24-page manual, a lot of helpful information on the design and use of gaskets. Included are discussions of subjects such as designing gaskets to reduce cost . . . practical tolerances for resilient gaskets . . . designing flanges for efficient sealing, and many others.

See "Armstrong's Gasket Materials" in Sweet's file for product designers. For a personal copy of this manual, write to Armstrong Cork Company, Gaskets and Packings Department, 1510 Arch St., Lancaster, Pa.

NEW
1951
EDITION



ARMSTRONG'S GASKET MATERIALS

Your nearest Armstrong Industrial Division office

ALBANY 10, N. Y., 64 Northern Boulevard, Telephone: 4-0131 • BOSTON 16, MASS., 131 Clarendon Street, Telephone: COpley 7-2490 • CHICAGO 54, ILL., 13-136 Merchandise Mart, Telephone: DElaware 7-0500 • CINCINNATI 2, OHIO, Temple Bar Building, 138 E. Court Street, Telephone: PARKway 3220 • CLEVELAND 15, OHIO, 209 Hanna Bldg. Annex, Prospect Ave. and E. 14th Street, Telephone: MAIn 7900 • DETROIT 26, MICH., 10th Floor, Free Press Building, 321 Lafayette Avenue, West, Telephone: WOODward 3-5670 • GREENVILLE, S. C., 83 Norwood Place, Telephone: GREENville 3-5302 • LOS ANGELES 15, CALIF., 719 Bendix Building, 1206 Maple Avenue, Telephone: RICHmond 0286 • NEW YORK 16, N. Y., 295 Fifth Avenue, Telephone: MURray Hill 4-6900 • PHILADELPHIA 2, PA., Robinson Building, Fifteenth and Chestnut Streets, Telephone: LOcust 4-4290 • ST. LOUIS 3, MO., 1205 Olive Street, Telephone: CHEstnut 1757 • In Canada: Armstrong Cork Canada Limited, 6911 Decarie Boulevard, Montreal, Quebec, Telephone: ATLantic 4733.



Model 8W Dynamatic Water-Cooled Coupling used to obtain adjustable speed from 200 HP, 720 RPM synchronous motor to drive a Plasticator carrying rubber from a Banbury Mixer in the plant of a large tire manufacturer.

DYNAMATIC[®] **WATER-COOLED** **POWER** **COUPLINGS**

WIDE SPEED RANGE
INSTANTANEOUS RESPONSE
ACCURATE SPEED CONTROL
STEPLESS SPEED ADJUSTMENT
SMOOTH TORQUE TRANSMISSION
TOTALLY ENCLOSED
SIMPLE • QUIET
COMPACT • EFFICIENT

Provide Adjustable Speed Drive with any AC Motor



The Dynamatic Coupling transmits rotation from a driving to a driven member without mechanical contact—with stepless adjustable control and with almost instantaneous response. It is a simple and effective method of providing adjustable speed from a constant speed source (or vice versa) with full-torque starts. The addition of an eddy-current brake will provide smooth controlled deceleration.

Effective water-in-the-gap cooling makes possible large capacity in small space, and the construction provides complete protection of the interior of the coupling against atmospheric impurities.

A standard range of sizes of Dynamatic Water-Cooled Couplings is available for transmitting torques of 50 pounds feet up to approximately 5,000 pounds feet. Many other sizes up to and including single units for handling 200,000 pounds feet of torque are in service and units of larger capacity can be built to order.

Write for Illustrated Bulletin WC-1

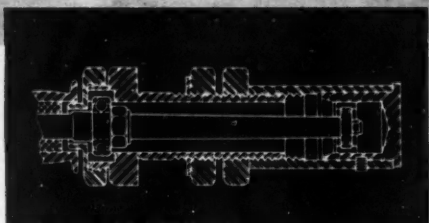
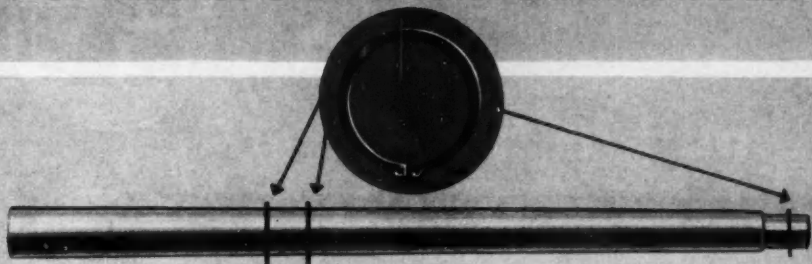
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CORPORATION • KENOSHA WISCONSIN

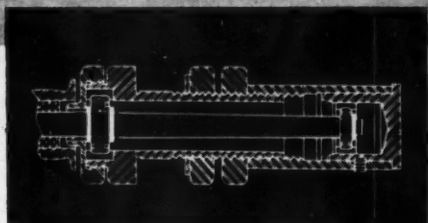
Subsidiary of EATON MANUFACTURING COMPANY, Cleveland, Ohio

Dynamometers	• Oil Well Draw-Works Brakes	• Adjustable-Speed Couplings	• Eddy-Current Brakes
Ajusto-Speedes	• Shovel Clutches	• Press Drives	• Lift Truck Clutches
			• Electronic Controls

3 TRUARC RETAINING RINGS LOWER COST... IMPROVE PERFORMANCE OF REVOLUTIONARY NEW TEXTILE SPINDLE!



OLD CONSTRUCTION. To position 2 ball bearings, an oversize diameter rod had to be turned on a lathe to provide 3 shoulders. In addition, blade required 2 threading operations... 2 lock nuts... separate tapering operation. Proper pressure of nuts against ball bearings required skilled labor adjustment.



NEW CONSTRUCTION. Standard rod, equal in diameter to finished blade is used. Three grooves for Truarc Rings and shoulder are made quickly and easily on a screw machine. Blade is economically tapered by centerless grinding. Truarc Rings maintain correct pressure on ball bearings for life of unit!

The H & B American Machine Company's new anti-friction CENTURY spindle is probably the most mechanically advanced spindle on the market today. Walde Truarc Retaining Rings have eliminated many of the material, tooling and assembly costs... have kept its price competitive. Truarc Rings not only simplify spindle assembly, they position ball bearings accurately... simplify maintenance... eliminate skilled labor... improve performance! And there are Truarc Rings to solve any design or re-design problem!

Redesign with Truarc Rings and you too will cut costs.

Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Walde Truarc Retaining Ring designed to do a better job of holding parts together.

Truarc Rings are precision-engineered... quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Truarc Rings can do for you. Send your blueprints to Walde Truarc engineers for individual attention, without obligation.

Walde Truarc Retaining Rings are available for immediate delivery from stock, from leading ball bearing distributors throughout the country.



SEND FOR NEW BULLETINS →

**WALDES
TRUARC**
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RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 2,392,947; 2,392,948; 2,416,852; 2,420,921; 2,429,341; 2,439,709; 2,441,946; 2,455,103; 2,493,350; 2,493,353; 2,497,802; 2,497,803; 2,491,306; 2,509,001 AND OTHER PATENTS PENDING.



Walde Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.
Please send engineering specifications and data on Walde Truarc Retaining Ring types checked below.

- ☐ Bulletin #5 Self-locking ring types
- ☐ Bulletin #6 Ring types for taking up end-play
- ☐ Bulletin #7 Ring types for radial assembly
- ☐ Bulletin #8 Basic type rings

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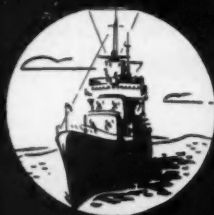
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Title _____
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City _____ Zone _____ State _____

5678

on land, sea and in the air

Acadia Synthetic Rubber Products are once again in great demand for the nation's defense. They are serving in a large variety of important purposes in weapons and equipment on land, sea and in the air. Manufacturers in hundreds of industries have learned they can always depend upon the uniformly high quality of Acadia Synthetic Rubbers.

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sheets • tubing • strips
• channel • washers •
seals • bellows •
gaskets • rings •
extrusions • cut parts



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Processors of Synthetic Rubber
and Plastics • Sheets •
Extrusions • Molded Parts

Synthetic

PRODUCTS

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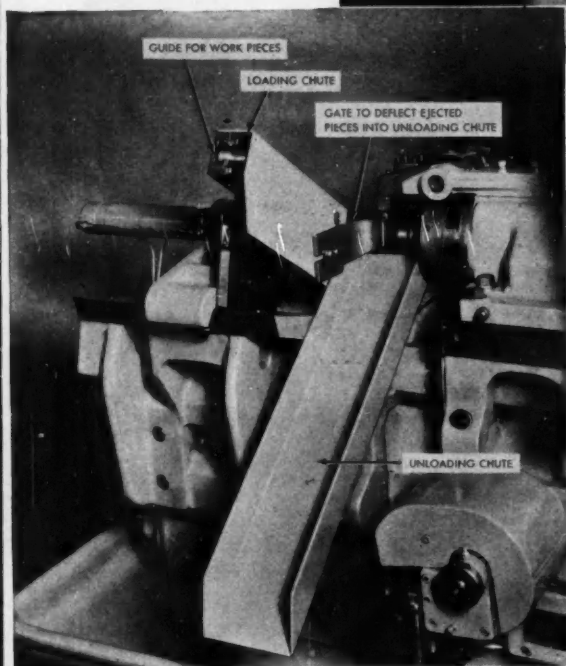
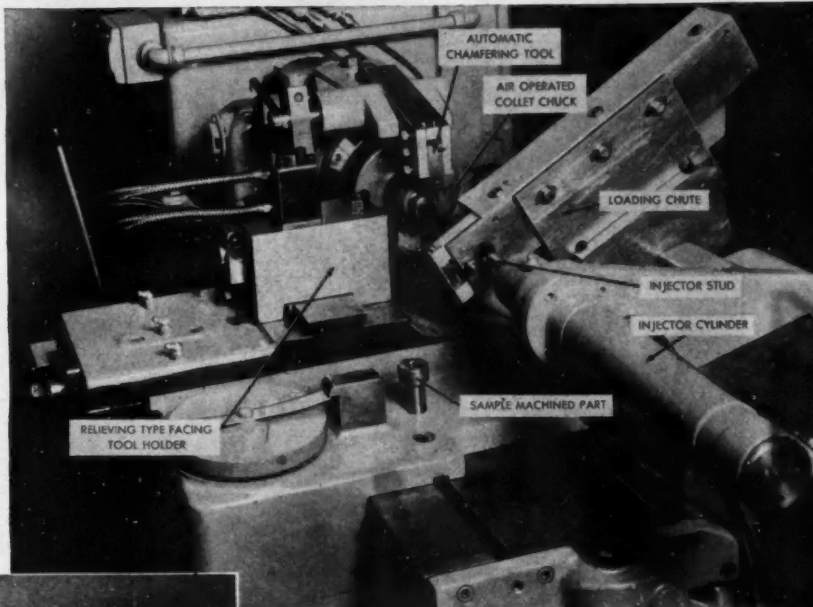
4035-4117 Ogden Avenue, Chicago 23, Illinois

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Automatic Loading enables the machine to produce to its full mechanical efficiency by eliminating the human equation.

AUTOMATICALLY LOADED IMP LATHES CUT MANUFACTURING COSTS



Problem: To finish face and chamfer bore of pump gear true with bearing diameter.

Solution: The Lo-swing IMP Lathe selected for this job was fitted with an injector type automatic loader which provides a very fast, completely automatic cycle, entirely eliminating hand loading and assuring a constant flow of machined parts at exceptionally low cost per piece.

The partially machined pump gears are placed in a loader chute and fed by gravity to the loader injector arm which picks up and places the part in an air operated collet chuck.

The facing operation is accomplished with a relieving type tool block mounted on the front slide. The tool is automatically relieved during the return stroke to avoid spiral tool marks. The chamfering operation of the bore is made with a swinging type tool block mounted on the headstock and automatically operated with a cam mechanism working in conjunction with the front cross slide.

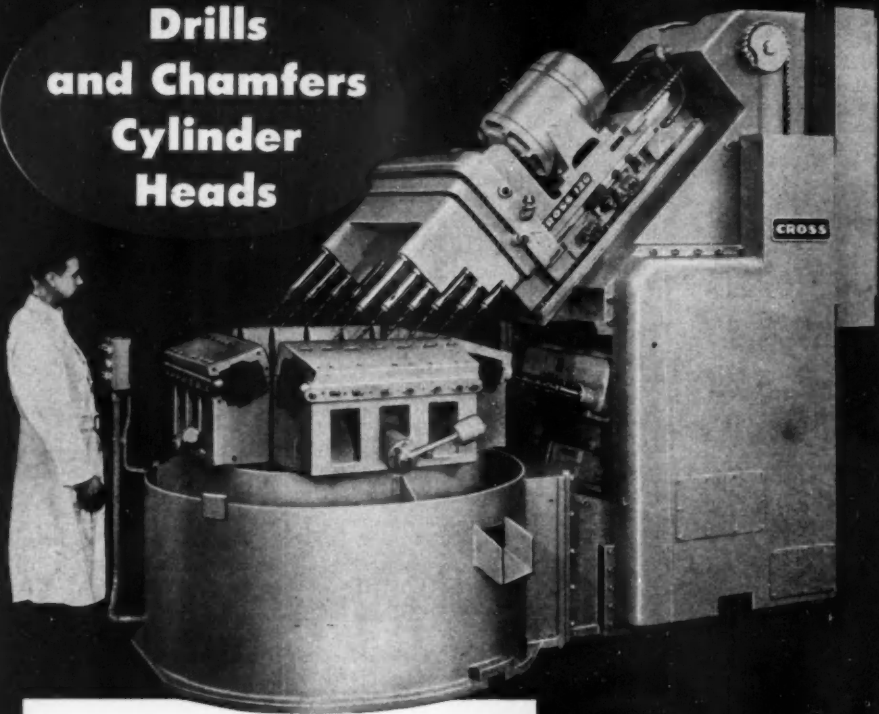
On completion of the machining operation the pump gear is automatically ejected by a plunger located in the bore of the spindle after which the cycle is repeated. Lo-swing Lathes fitted with Automatic Loaders are usually grouped together in series of two or more, since one operator can easily keep the loading chutes on several machines filled with pieces.

Seneca Falls engineers are always at your disposal to find cost cutting solutions for your turning problems.

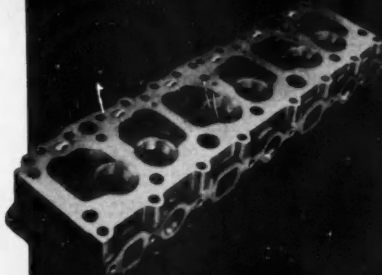
PRODUCTION COSTS ARE LOWER WITH Lo-swing

Another Special by Cross

**Drills
and Chamfers
Cylinder
Heads**

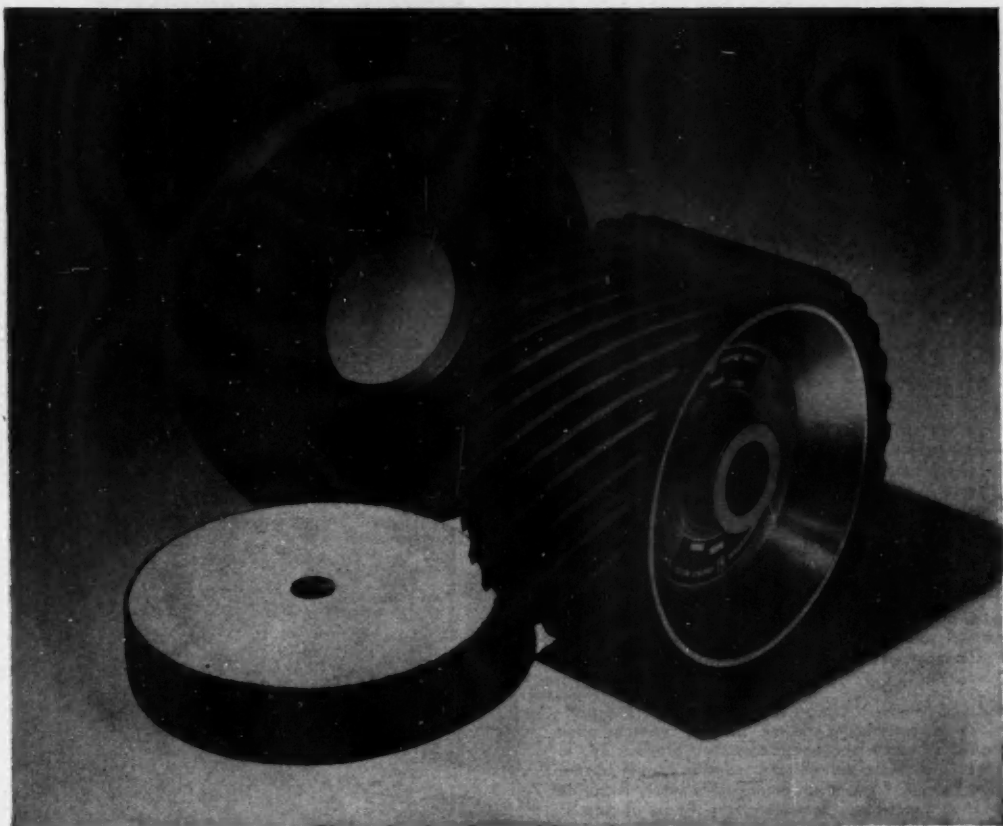


- ★ Drill 12 angular holes and countersink 8 manifold mounting holes in cylinder heads.
- ★ 170 pieces per hour at 100% efficiency.
- ★ Fluid motor, power driven index table.
- ★ Other features—J.I.C. standard construction; stranded wire electrical installation; hardened and ground ways; hydraulic feed.



Established 1898

THE
DETROIT 7, MICHIGAN
Special MACHINE TOOLS CO.



Too many wheels?

Not when each wheel represents a basic method of abrasive application. The "61" Contact wheel is used with an abrasive belt. The Set-up wheel, with grain applied to its periphery, is ideal for many types of polishing. The grinding wheel is perhaps most familiar.

Each wheel is specially designed to perform a specific job better, faster and at

less cost. *All* of these are available from one source... CARBORUNDUM. For, only CARBORUNDUM makes all abrasive products, from which you can select those best suited to your operations.

That's why more concerns are looking to CARBORUNDUM for the right answer to every abrasive need. Next time... call in CARBORUNDUM... and be sure.

Only **CARBORUNDUM**
TRADE MARK

makes ALL Abrasive Products... to give you the proper ONE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

AUTOMOTIVE INDUSTRIES, October 1, 1951

AIR-PAK

HYDROVAC

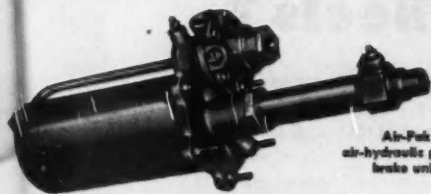
Either Way - YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for any commercial vehicle. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

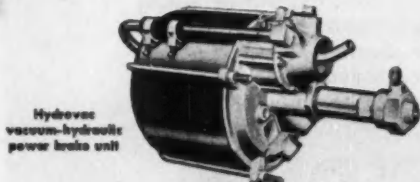
Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

REG. U. S. PAT. OFF.



Air-Pak
air-hydraulic power
brake unit

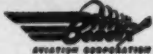


Hydrovac
vacuum-hydraulic
power brake unit

BRAKING HEADQUARTERS for the AUTOMOTIVE INDUSTRY

BENDIX • PRODUCTS • SOUTH BEND

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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

Pontiac's New Engineering Building

On the outskirts of Pontiac, Mich., Pontiac Division of General Motors Corp. recently raised the curtain on its new Engineering Building. Joseph Geschelin here explains its many unique features. Page 32.

Small Cars Dominate Second Berlin Show

At the Second Berlin International Automobile Show held September 6th to 16th, Germany came forward with a new host of small cars which today in Europe affords the only possibility of a car in every garage. See page 34.

Torque Converter for Trucks

The latest Twin Disc Clutch Co. hydraulic torque converter incorporates a rather unique means of applying downhill braking power. In this article the torque converter is pictured and its performance curves shown.

Largest Flying Boat

Intended for non-stop service between London and New York, this 140-ton Princess flying boat nearing completion in England, is the largest craft of its type ever constructed. Page 40.

Ford Automatic Transmission

Fourth in a series of articles devoted to production of the Ford-Mercury transmission, this installment describes how the company is using a great deal fewer parts in its construction. Page 44.

27 New Products And Other High Spots, Such As:

Automotive and Aircraft Sealers; NBS Research on the basic nature of detonation; the first European Machine Tool Show; progress report on the coal-burning gas turbine; timely subjects discussed at the SAE tractor-production meeting; new machines for making tank torquatic transmissions; and five tons of magnesium used in the B-36 airframe.

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For Complete Table of Contents, See Page 3*

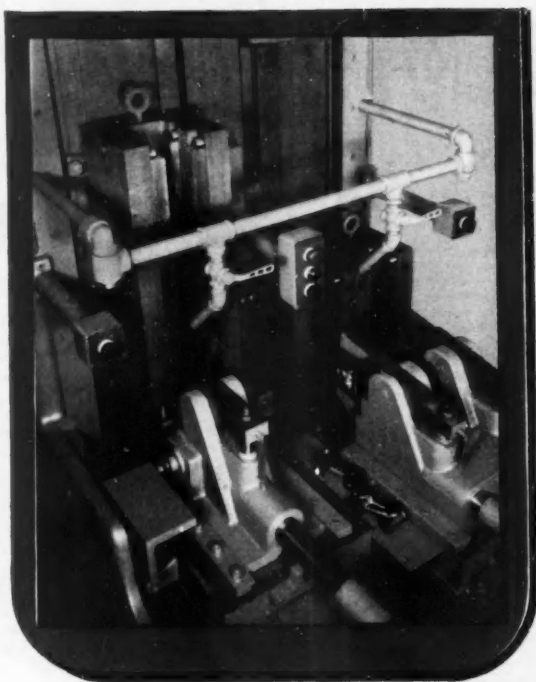
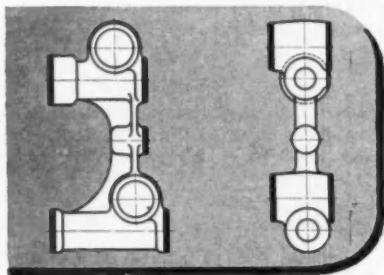
AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

NINE SURFACES

HYDRO-BROACHED IN TWO OPERATIONS

Below: Drawing of part broached on the CINCINNATI equipment illustrated here. Heavy lines indicate broached surfaces.

Part name.....	Valve rocker bracket
Material.....	Cast iron
Operation.....	Broach all bosses
Broaching speed.....	35 feet per minute
Production.....	280 parts per hour
Equipment.....	CINCINNATI No. 5-42 Duplex Vertical Hydro-Broach, completely equipped



There's usually a way to save man-hours and floor space while increasing or retaining the production of many machining operations. The equipment illustrated here shows one way to do it.

In two progressive operations nine surfaces of valve rocker brackets are broached each cycle of the machine, at a production rate of 280 parts per hour.

For this job, Cincinnati Application Engineers tooled up a new No. 5-42 Duplex Vertical Hydro-Broach with suitable broach holders, inserts (cutters), and two automatic fixtures to accommodate three sizes of parts. In progressing from the left- to the right-hand fixture, all nine surfaces are quickly and accurately broached. ¶Does this equipment and method give you an idea which you would like to apply in your own shop? Our Application Engineers will help you work out the details. But if you're not familiar with the new CINCINNATI Duplex Vertical Hydro-Broach Machines, we suggest that you write for literature. You'll find that it's well worth waiting for these new machines.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

CINCINNATI



MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE INDUSTRIES

Vol. 105, No. 7

October 1, 1951

Car Makers Loan \$10 Million to Pittsburgh Steel

Chrysler and Packard have concluded separate agreements with Pittsburgh Steel Co., under which they will loan the steel producer \$10 million to be paid back with a specified tonnage of steel in the next five years. Chrysler will lend the Pittsburgh firm about \$8 million in return for which it will get 800,000 tons of steel products, principally, cold rolled sheet. Packard's loan is for \$2 million, and calls for 200,000 tons of steel in the five year period. In both cases, other products than sheet are specified. The agreement provides that Pittsburgh Steel can borrow the specified amount from each company if necessary to complete expansion of a cold rolled sheet mill at Allenport, Pa. GM has similar agreements with Jones and Laughlin Steel Corp. and Republic Steel.

Ray Rausch to Aid Munitions Board

Raymond R. Rausch, vice president of Willys and well known in the automobile industry for his production achievements during a long tenure at Ford, has been appointed a special consultant and trouble shooter for the Munitions Board. Before joining Willys last August he had been vice president in charge of manufacturing policy for General Electric. He will serve without pay in his Munitions Board assignment.

New Priority Rating Used for Machine Tools

It is understood that one of the first uses of NPA's new "DX" priority rating will be to obtain critical components for machine tools to be used in the defense program. The new rating takes priority over DO orders for products, components, or materials other than steel, copper, or aluminum. It is supposed to be used very sparingly and can be only invoked by NPA and may not be issued by other government agencies. The move is looked on as the first step in creation of "multiple band" priorities which created so much confusion during the early part of World War II.



BUS AND TRUCK

Called the Bruck the newest model of Kenworth's combination passenger and freight carrying bus and truck has just come off the production line at Kenworth Motor Truck Corp.'s factory in Seattle. This new Bruck provides space for 21 passengers and has a freight body 24 ft long. Its GVW rating is 44,000 lb, and the vehicle is powered by a Hall-Scott horizontal 220-hp engine.

Long Boom Predicted for Machine Tools

Boom times for machine tool manufacturers will extend through 1953 and beyond, according to an estimate by C. E. Wilson, defense mobilizer. He predicted that machine tool requirements up to the end of 1953 will be nearly \$3 billion, of which about \$800 million will be produced this year and nearly twice that amount in 1952. He said that a particularly bad pinch is developing in special purpose machine tools required for specialized military items.

See 1951 Car Output Third Largest

It now seems fairly certain that the automobile industry will produce five million cars without too much trouble and may exceed that goal if materials are available up to the limit of NPA allocations. At any rate, the industry is reasonably certain to have the third largest year on record. Copper has taken over the number one position as the most critical metal. Steel is also very tight, but the copper strike was a serious blow and undoubtedly the sup-

ply of that metal will regulate the extent of production for the balance of the year.

Looking ahead to 1952, general opinion is that the industry will be able to build about four million passenger cars and a million or more trucks. NPA has indicated that allotments will be reduced during the first quarter of the year, but it still is expected that the industry will be permitted to make about one million cars. There is considerable doubt, however, that enough materials will be available to build up to the 1.1 million units in the last quarter of this year, or one million in the first three months in 1952. On the other hand, there is some optimism that a more orderly flow of materials will be possible by the middle of next year.

Passenger cars still are not included under the CMP program. And latest reports indicate that it will be November at the earliest before that will occur. In fact, there is some opinion that it may be December or even January before all of the paper work can be finished to bring the industry completely into CMP. Meanwhile, industry representatives have been talking with NPA about a possible realignment of percentage-of-industry allotments. For

News of the AUTOMOTIVE

one thing, some of the independents for reasons of materials shortages, labor trouble, or slow sales, did not build up to their full permitted total of cars during the third quarter. Also, the Defense Production Act requires that current performance be considered in making allotments to individual companies which is not the case in current allotments which are based on the years '47, '48, and '49. NPA is considering some shuffling of allotments, but is also keeping in mind that in the event of further production cuts and a position strengthening of the market, small independents may have to receive special consideration to keep them at a break-even point, or above.

defense work accounted for only five per cent of the company's volume.

USAF Cancels Reynolds Press Plant Contract

The U. S. Air Force has terminated its contract with Reynolds Metals Co. for operation of the government-owned experimental press plant at Adrian, Mich. It had been shut down for 11 weeks by a strike of UAW-CIO maintenance workers. It is reported that a temporary custodian has been named for the plant, and that another company will soon sign a contract to operate it. The project contains several experimental extrusion presses brought from

carried out at K-F's subsidiary, Kaiser Manufacturing Corp., in a plant at Richmond, Calif., leased from the Santa Fe Railway. During World War II, it was operated by the Kaiser organization as a plate shop. Production is scheduled to begin within 90 days.

Pacific Airmotive Gets Contract

Pacific Airmotive Corp. received a new Air Force contract amounting to \$3.5 million for overhaul of an undisclosed number of large four-engine Air Force cargo-transport planes. The company's backlog is now over \$11 million.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	July 1951	June 1951	July 1950	Seven Months		Per Cent Change		
					1951	1950	July over June	July over July 1950	Seven Months 1951 over 1950
1	New England	23,167	25,200	41,170	185,900	201,017	- 8.07	-43.74	- 7.57
2	Middle Atlantic	77,295	83,305	117,180	612,656	654,770	-17.16	-34.04	- 6.40
3	South Atlantic	48,630	54,962	70,305	379,101	412,462	-15.19	-33.90	- 6.09
4	East North Central	108,306	112,223	142,299	638,982	643,000	- 3.49	-23.87	- 0.48
5	East South Central	16,823	20,705	32,696	148,257	183,798	- 8.61	-42.11	-10.32
6	West North Central	41,953	48,049	67,252	333,803	363,640	-12.69	-37.62	- 8.06
7	West South Central	35,861	39,270	61,673	279,610	311,516	- 7.16	-42.25	-10.16
8	Mountain	14,047	14,622	25,290	107,296	123,758	- 3.93	-44.46	-13.30
9	Pacific	40,441	47,290	82,203	329,044	346,841	-14.48	-22.53	- 8.06
Total—United States		406,333	464,665	609,926	3,214,919	3,439,863	-10.63	-33.35	- 6.94

States comprising the various regions are: Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2: N. J., N. Y., Pa.—Zone 3: Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.—Zone 6: Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

Developments Coming on Power Steering

Popularity of power steering introduced by Chrysler this year will spur adoption by other manufacturers, particularly in the larger cars. While the Chrysler unit and the one expected to be adopted by Cadillac next year operate hydraulically, at least one other type is under development in the industry. Information is very sketchy, but there is some opinion that hydraulic steering may not be the final answer and that some other source of supplemental power for steering may be developed.

White Motor Gets \$8 Million Order

White Motor Co. has been awarded a contract for more than 1400 trucks, tractors, and dumping units. With the inclusion of spare parts, the order amounts to approximately \$8 million and will increase considerably White's defense work for the fourth quarter of this year and the first three months of 1952. During the first half of this year

Germany following World War II. It had been operated by Gerity-Michigan Corp. before being turned over to Reynolds.

Half of GM Development Work for Military

Indicative of the growing importance of defense work to the automotive industries is the percentage of military development work being carried on by GM. At the opening of the new GM Technical Center recently, C. A. Chayne, vice president in charge of engineering, said that about a half of GM activities in engineering and development is devoted to defense projects for the government.

K-F Gets New Order for Aircraft Parts

Kaiser-Frazer will spend more than \$6 million for plant modification and tooling for machining of aircraft parts under a new contract with Boeing Airplane Co. The contract calls for machining of about 90 different aluminum forgings for the B-52A, and will be

Firestone Awarded Contract by Army and Navy

Contracts amounting to \$5,155,500 for the engineering and construction of a new-type abandon ship inflatable boat and an improved 12-ton half-float have been signed with the U. S. Navy and the Army Engineer Corps, the Firestone Tire & Rubber Company has announced.

New Chrysler Parts Plant to Produce Jet Parts

About one third of the manufacturing area of Chrysler's new parts plant at Indianapolis will be used initially for production of jet aircraft engine parts. Tools for the project are already placed and will be installed as soon as the building is ready this fall. The plant is about 85 per cent completed. The engine parts will be for the J-48 turbo-wasp engine, which Chrysler will build for the Navy in a new plant now under construction north of Detroit.

INDUSTRIES

Bell Aircraft Gets New Contracts

New military contracts and sub-contracts awarded the Bell Aircraft Corp. have lifted the company's backlog to approximately \$300 million, an increase of \$30 million in the last two months. Included in these new orders are substantial contracts for jet-engine nacelles for B-47 bombers. The B-47 is scheduled to go into expanded production in 1952, and Bell has received contracts to supply the jet "pods" for all that are built. Bell has also just received a contract from the Air Force to set up tooling facilities for the production of guided missiles.

Lockheed Permits Canada to Make T-33 Jet Trailer

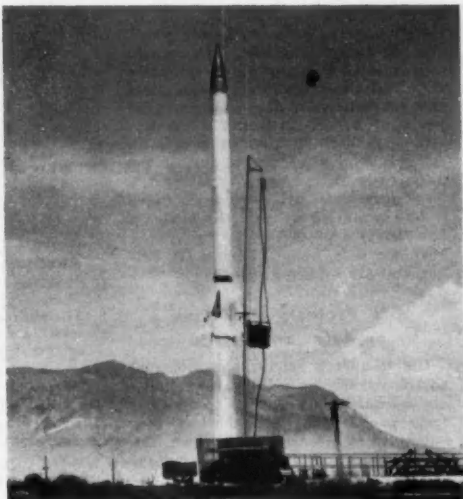
Lockheed Aircraft Corp. has signed a contract with the Canadian government in Ottawa authorizing Canadian manufacture of Lockheed T-33 jet trainer airplanes. The Canadian government has appointed Canadair Ltd., Montreal aircraft company, as its agent to build the planes. Tooling for production will begin in the Montreal plant immediately.

Goodyear and McDonnell to Make New Navy Jet

The Goodyear Aircraft Corp., and the McDonnell Aircraft Corp., have been awarded letters of intent by the Navy for the production of the Navy's newest jet fighter, the McDonnell F3H-1 Demon. Although the dollar value or the number of planes involved in the negotiations cannot be disclosed due to security requirements, both Goodyear and McDonnell will be awarded prime

ROARING UP

Shown roaring up to set a new world's record of 135 miles for single stage rockets, the Navy's Martin Viking high altitude research rocket reached a top speed of 4100 mph. The Viking's liquid oxygen and ethyl alcohol rocket engines burned for 75 seconds and in that time it had reached an altitude of 25 miles and then coasted the rest of the way to 135 miles which it reached in 4 min. 23 sec.



contracts. Goodyear will produce the plane at its Akron plant under terms of a licensing agreement with McDonnell, and the McDonnell production will be at its St. Louis plant.

Hudson Gets Third Defense Contract

Hudson has received its third aircraft contract and has started tooling for production. The order is from Boeing's Wichita Div. to tool and manufacture forward sections of the fuselage of the B-47 Stratojet bomber. Production will not interfere with production of automobiles at levels permitted by

NPA. The value of the contract was not given other than that it would be "in the millions."

Baldwin-Lima-Hamilton Gets Jet Part Contract

Baldwin-Lima-Hamilton Corp., Eddystone, Pa., has received a contract from the Wright Aeronautical Corp., Wood-Ridge, N. J., to manufacture the turbine end of the Wright J-65 jet engines. Although Baldwin-Lima-Hamilton is listed among the world's oldest and largest turbine manufacturers, this is the company's first venture in supplying turbines for jet aircraft.

Name Cahall Deputy Head of Cataloging Agency

New deputy director of the Munitions Board's Cataloging Agency is Ralph J. Cahall, former automotive executive. The appointee has served as industry coordinator of the agency since 1949. In his new post, he succeeds Col. Oscar A. Schroeter, USA. A pilot instructor in the Army Air Corps during World War I, Mr. Cahall left an industry position in 1942 to become administrative manager of the Tank-Automotive Center in Detroit.

K-F Expects to Show Profit in Last Half

Kaiser-Frazer expects to show a profit for the last half of this year but it is not known whether it will be suf-



EXPERIMENT EXPLODES

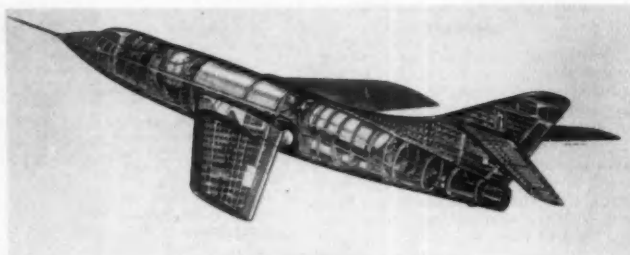
The Handley-Page HP.88, Britain's latest experimental jet fighter, exploded recently during secret tests in England. Recently declassified by the British Air Ministry, the plane was powered by the Rolls Royce Nene jet engine.

News of the AUTOMOTIVE

ficient to put the company in the black for all of 1951. Edgar F. Kaiser, president, speaking in Portland, Ore., where K-F has an assembly plant, said that he is definitely optimistic about sales and production for next year and that tooling for 1952 models is underway. Although K-F has shown profits in some individual quarters during the past two years, it has not been in the black for a full year since 1948. Since it was organized in 1945, the company has shown a profit in only two years, 1947 and 1948, when it earned \$19 million and \$10 million respectively.

GM Protests Limitation on Automatic Drives

GM is understood to have protested vigorously against NPA's order limiting the number of automatic transmissions to be made available on new automobiles. As originally drawn, the order would limit the number of automatic drives beginning Oct. 1 as follows: cars costing \$1800 or less, 35 per cent; those between \$1800 and \$2500, 65 per cent; and upwards from \$2500, 100 per cent. It is the middle bracket that is doing all the damage to GM, particularly Pontiac, Buick and Oldsmobile. It is estimated that a number of cars with automatic drives would be reduced as follows for these three divisions if the order is not changed: Pontiac, about 15 per cent; Buick Special and Super series, 15 to 20 per cent; and Oldsmobile, 25 to 30 per cent on its Super 88.



HIGH FLYER

This phantom view of the Navy Douglas Skyrocket shows the plane installed with both rocket and jet engines of earlier flights. Altitude records were set by eliminating jet engine and doubling rocket fuel for steep climb at 1000 mph after air launching from a mother plane at 35,000 ft.

Chevrolet would be little affected, since it has been running a little under 40 per cent and is allowed 35 per cent.

Generally, other companies in the industry will feel little or no effect from the order because they have been at or below their permitted usage. The order was obviously ill considered and completely unreasonable since the three GM divisions most seriously affected have no way of getting an adequate supply of synchromesh transmissions to make up for the proposed cut in automatic drives. It would take several months for Buick, which supplies these transmissions, to expand production and tooling to take care of the deficit. Obviously, the limitation will have to

be eased if production and employment in these divisions is not to be seriously curtailed.

Car Price Increases Called Inadequate

Price increases granted by OPS were welcome to the hard pressed automobile manufacturers, but are still considered to be inadequate to meet cost increases. The Big Three acted immediately to take advantage of the price relief formula with Chrysler taking the largest increase, averaging about 6½ per cent, and Ford the smallest, ranging from 2½ to 4.3 per cent. GM was on middle ground with price rises ranging from 4.02 to 5.2 per cent. Actually the price increase was not granted under the Capehart amendment which permits taking into account all cost increases in the year preceding July 26. OPS acted by amending the original car pricing order by allowing for increases in material cost up to Dec. 31 last year, or March 15, 1951, depending upon the material, and labor cost increases up to March 15. The Capehart amendment was by-passed because OPS has not yet worked out details of how it would apply.

However, industry spokesmen say emphatically that the current pricing order is entirely inadequate since it does not take into account many of the indirect costs, and further increases may come later under the Capehart amendment. George Romney, vice-president of Nash, told a Senate Banking subcommittee that his company will absorb \$11 million in added costs over the next nine months even under the new ceilings, and that before price relief was granted cost absorption was running \$1.5 million a month. Both Chrysler and Ford have also voiced their dissatisfaction with the pricing

1951 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1951 Seven Months' Totals.

MAKE	SEVEN MONTHS			Units		Per Cent of Total		
	July 1951	June 1951	July 1950	1951	1950	1951	1950	
Chevrolet	88,970	94,921	126,897	691,571	795,020	21.51	23.11	
Ford	88,096	79,557	99,094	553,082	674,965	17.23	19.61	
Plymouth	48,035	57,190	61,419	352,233	219,379	10.96	6.39	
Buick	36,735	33,015	48,084	251,796	296,467	7.83	8.71	
Pontiac	27,266	27,782	39,279	212,066	246,830	6.80	7.23	
DeSoto	24,313	27,969	27,182	182,291	131,382	5.67	3.82	
Oldsmobile	22,167	23,439	35,153	175,180	208,422	5.45	6.06	
Mercury	16,253	21,175	28,773	146,027	185,467	4.56	5.39	
Studebaker	15,014	16,263	24,526	121,240	171,206	3.77	4.96	
Chrysler	11,921	14,550	18,134	98,000	68,579	3.08	1.91	
Nash	11,710	11,700	20,261	70,771	108,850	2.48	3.19	
De Soto	9,007	10,506	14,173	67,768	48,370	2.11	1.44	
Hudson	6,889	7,940	15,018	64,492	88,601	2.01	2.58	
Cadillac	7,022	7,992	9,301	56,978	47,549	1.53	1.29	
Packard	5,109	5,150	7,046	41,706	44,979	1.30	1.31	
Kaiser	3,989	4,141	13,116	34,837	37,793	1.09	1.10	
Henry J.	3,877	4,612		34,095		1.00		
Willys	2,535	2,503	4,522	16,864	19,398	.51	.66	
Lincoln	1,710	1,969	3,306	15,420	19,486	.48	.57	
Crosley	383	476	754	3,488	3,868	.11	.11	
Fraser			1,677		9,019		.26	
British Austin	214	239	606	1,968	3,456	.06	.10	
British Ford	294	267	199	1,767	742	.05	.02	
Misc. Domestic	206	280	222	1,244	411	.04	.01	
Misc. Foreign	1,024	1,097	992	7,255	3,533	.22	.10	
Total—All Makes	406,333	404,065	609,926	3,214,919	3,438,063	100.00	100.00	

* Based on data from R. L. Polk & Co.

INDUSTRIES

order. Price increases granted include the following

General Motors		
Chevrolet	\$ 61.74 to	\$ 93.09
Pontiac	60.83 to	94.03
Oldsmobile	75.91 to	109.04
Buick	90.41 to	172.37
Cadillac	132.65 to	208.85
Chrysler Corp.		
Plymouth	\$91.12 to	\$131.94
Dodge	98.56 to	152.07
DeSoto	134.36 to	216.36
Chrysler	141.82 to	462.62

Ford has revealed only its wholesale dollar increases. They are as follows and include the average for each line.

Ford		
Ford	\$ 49.53	
Mercury	41.53	
Lincoln	70.95	
Cosmopolitan	57.82	

To these figures must be added Federal, State and local taxes, transportation charges, dealer markup, and delivery and handling charges. Studebaker has increased its prices \$15.78 to \$21.95 on the Champion line, and \$94.17 to \$117.36 on the Commander.

Nash has raised its prices from \$47.90 to \$65.85 at factory list level. The increases range from \$47.90 to \$55.35 or 2.92 per cent on the Statesman; from \$60.55 to \$65.85 or 2.98 per cent on the Ambassador; and \$63.85 or 3.61 to 3.81 per cent on Rambler models.

Borg-Warner to Build New Plant in Ohio

Borg-Warner Corp. will build a new 100,000 sq ft plant at Wooster, O., for production of electrically driven hydraulic and fuel pumps for jet engines. The \$3 million plant will be built for the newly-formed Wooster Div. and will get underway early this month if CMP materials are granted soon. The most modern production equipment for the manufacture of aviation parts will be installed in the new plant.

K-F Re-Employs Most of Laid-off Workers

Employment at Kaiser-Frazer is rapidly on the rise again, and nearly all of the 5000 workers laid off earlier this year have been recalled. The K-F seniority and probationary employee recall lists are nearly exhausted and the company estimates that by late November it will have to resort to outside hiring. The company now employs about 11,000 and expects to step up its payroll to 20,000 by next summer.

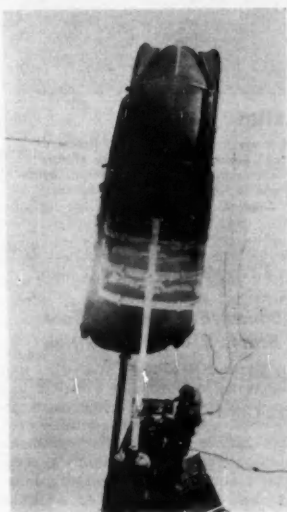
Ford of Canada Plans Australian Expansion

Ford Motor Co. of Canada, Ltd., will spend \$14 million for expanding manu-

facturing facilities at its subsidiary, Ford Motor Co. of Australia, Pty., Ltd., at Geelong, Australia. The expansion program will provide facilities for making the latest type Ford V-8 engine and will increase assembly facilities at Brisbane, Sydney, Adelaide and Perth. The announcement by C. A. Smith, managing director of Ford of Australia, said that the program will make possible manufacture of engines for large passenger cars and trucks up to five tons capacity.

Clearing Machine Buys New Building

The Clearing Machine Corp. has purchased a factory building of approximately 100,000 sq ft working area in Hamilton, O. The new plant, which



TIMING

This electronic timing instrument has been developed by the Chrysler Corp. to measure and record the initial acceleration of automobiles to hundredths of an inch and fractions of a second. This triple exposed photograph shows how a Plymouth pulls a tape through the timing device, using an electronic spark to record results in terms of both distance and time.

was purchased complete with machinery and equipment from the Hamilton-Thomas Corp., will be used immediately in expanding Clearing Machine's production to meet urgent defense requirements. With the purchase of the Hamilton property, Clearing Machine has abandoned plans to erect a factory

building on recently acquired land in Joliet. Material shortages and other difficulties, company officials said, would have delayed construction so that many months of production would have been lost as compared to operations which will begin almost immediately in the Hamilton plant.

Quality Control Convention in Syracuse, N. Y. in May

The American Society for Quality Control will hold its sixth annual convention in Syracuse, N. Y., May 22-24, 1952. The ASQC has as its purpose to promote greater use of the science and techniques of quality control through indoctrination of both management and technical personnel in the statistical approach to plant problems. The 1952 convention is under the general chairmanship of Leon Bass, General Electric Co., Electronics Park, Syracuse, N. Y.

Glenn Riegel to Lead Metal Show Talks

Glenn C. Riegel, chief metallurgist for Caterpillar Tractor Co., will lead technical sessions at the World Metallurgical Congress in Detroit, Oct. 14-19. He is widely known for his work with steel hardening methods.

Continental Earnings Show Sharp Rise

Continental Motors Corp. has shown a sharp rise in earnings for the nine months ended July 1, 1951, as compared to the same period a year ago. Net profit was \$3,276,292 compared with \$2,513,667 for the same period of 1950. Sales for the nine months this year are more than \$119.2 million compared with \$68 million a year ago.

Defense Dept. Has Inventory of Machine Tools

Washington now houses a central inventory record of Defense Dept. machine tools to be used by any military service having difficulty in getting delivery of new production items. Operated by the Munitions Board, the administration of the inventory will be handled by C. E. MacArthur, a former business executive. The record will be used to speed up reallocation of those machine tools not in continuous use. Representatives of any of the three military departments will be able to search the entire catalog to find which tools are available. Any service needing a particular item to break a production bottleneck may be able to draw on the tool reserves of the other services. It is not intended that the inventory be

News of the AUTOMOTIVE



FOR FAST BREAKING

This new lift type Taylor Disc Tiller, a heavy, rigid frame implement for fast breaking in a wide variety of field and soil conditions, has been added to the Dearborn Motors Corp.'s line of implements. The Taylor Disc Tiller is attached to the Ford Tractor by means of three hitch links and a stabilizer bracket and is lifted and lowered by Ford Tractor Hydraulic Touch Control.

used to meet tooling requirements for entire programs, nor does the Munitions Board view the record as a complete answer to the national machine tool problem. However, the Board is considering steps to be taken in preventing a prolonged shortage of this production equipment. Its members are giving attention to a proposal that a long-range machine tool stockpile program be instituted.

GE Vehicle Shuttles Coal from Vein to Car

Operating like an Army tank, a new vehicle has been developed by the General Electric Co. for use in shuttling coal from veins to coal cars far beneath the earth's surface. Equipped with treads similar to those on an Army tank, the shuttle car is powered electrically, and its power cable is plugged into an outlet in the same way household appliances are. The 600 ft of cable are automatically reeled in or out as the car travels. Coal is first loaded on the car deep in a vein, and then the shuttle car carries its load to the main tunnel and transfers it to small railroad cars or belt conveyors which then take the coal to the hoists or directly to the surface. The vehicle can carry

up to 10 tons of coal. It is about 22 ft long, 8 ft wide, and 3 to 4 ft high.

Sundstrand Machine Tool Starts \$700,000 Addition

Sundstrand Machine Tool Co. has started construction of a \$700,000 addition to its manufacturing plant to provide space for increased defense production and to segregate government production from the company's commercial manufacture of transmissions, pumps and accessories. The addition will enlarge the company's present hydraulic division, providing 85,000 sq ft of floor space, primarily for shop use but including 15,000 sq ft of office space. The new building is expected to be ready for use by next summer. The estimated \$700,000 expenditure is exclusive of equipment costs.

New Alloys Required to Meet Jet Goal

If this country is to meet its production goal of 216,000 jet engines in 1953, new alloys must be developed, which can be substituted for those containing scarce materials, according to J. D. Nisbet of General Electric. He said that the present supply of strategic materials is inadequate to meet the stated

objective, and that alloys containing such non-strategic metals as iron and titanium must be developed. He added that the GE Research Laboratory has been working for a long time on development of new high temperature alloys.

British Cars Registered in U. S. Up 52% in First Half of '51

Registrations of British cars in the U. S. increased 52 per cent during the first six months of 1951, compared to the same period last year, according to Sir William Welsh, representative of the British automobile industry. Sales of British cars in the U. S. during 1950 totaled 19,997, representing a value of \$16,730,000—an increase of nearly 200 per cent over the previous year. The U. S. and Canada together imported 96,226 British cars, valued at \$60,210,475 last year, Sir William said.

Dormant Scrap Drive Nets 775 Carloads

The automobile industry's drive for dormant scrap has already resulted in shipment of more than 33,000 tons, or about 775 freight car loads, to steel mills. J. A. LaCourse of Packard, chairman of the Automobile Manufacturers Association scrap committee, says that movement of scrap to mills will increase sharply after both automobile companies and suppliers have completed review of their equipment inventories. The program is concentrating on scrap-ware of obsolete tools, dies, machinery, and other equipment, and is aimed to augment the regular scrap procedures of the industry.

Government Gives Stored Tools for War Jobs

Approximately \$2 billion worth of surplus machine tools are being offered free to manufacturers for use in defense production. The tools have been in storage since the end of World War II and their value now is considered to be from 45 to 85 per cent more than at the end of the last war. The tools are located in a government plant at Marietta, Ga., and are being shipped out at government expense to defense contractors at the rate of two trainloads a day. They include lathes, grinders, welding equipment, drills, and hydraulic presses. Many automobile companies are included among those receiving the tools. A similar program will be carried out from a stockpile at a former Glenn L. Martin plant at Omaha. The

INDUSTRIES

equipment, while not of a suitable type for production of jet engines, can be used for many airplane and tank parts.

Fruehauf Trailer Forms Brazilian Unit

The Fruehauf Trailer Co. has organized a new company to assemble and manufacture in Brazil all kinds of trailers and trailer bodies designed specifically by Fruehauf for Brazil. The new organization will be known as Fruehauf Trailer S. A., Industria e Comercio and will have headquarters in Sao Paulo, Brazil. Dr. Ary F. Torres has been elected director-president. L. C. Burnett is managing director of the new enterprise.

Pope-Toledo First in Old Car Show

First prize in the first annual old car festival held at Greenfield Village in Dearborn, Mich., by the Veteran Motor Car Club of America was won by a 1905 Pope-Toledo. The award was made on the basis of "authenticity, general appearance, and mechanical ability." Eighty-eight cars were represented at the showing which is planned to be held yearly. Other prizes were won by owners of a 1910 Maxwell, which was driven from Chicago to Dearborn, a 1903 Cadillac for slow operation in high gear, and a 1908 two-cyl Sears, a 1906 one-cyl Reo, and a 1911 Ford in the cranking contest.

NPA Restricts Use of Aluminum

Use of primary aluminum in manufacture of passenger car pistons is forbidden in National Production Authority's order M-68A. The order likewise places strict limitations on use of automatic transmissions in low- and medium-priced vehicles. No restrictions are placed on transmissions for cars priced at more than \$2,500. Under the order, only secondary aluminum or cast iron may be used for passenger car pistons. As to the automatic transmissions, manufacturers of cars with a factory delivered price of \$1,800 or less may not place the transmission on more than 35 per cent of output. Cars in the price range from \$1,800 to \$2,500 are restricted to 65 per cent.

To Hold Motor Boat Show in New York in January

The 42nd annual National Motor Boat Show will be held in New York City Jan. 11-19, 1952. Members of the 1952 show committee are: chairman, George

W. Codrington, vice president, General Motors Corp. and general manager of its Cleveland Diesel Engine Div.; John W. Mulford, president, Gray Marine Motor Corp.; Leon E. Travis, president, Richardson Boat Co., Inc.; Fred L. Hewitt, Jr., president, Century Boat Co.; and Ralph G. Klieforth, president, Universal Motor Corp.

Willis Adopts BLS Index Pay Plan

Willis-Overland Motors, Inc., has made the cost-of-living pay plan and the annual improvement factor unanimous in the automobile industry by signing a long term contract with the UAW-CIO. Willis was the last automobile company to agree to the escalator type contract, which has spread through the industry since first being introduced by GM in 1948. Willis has not had a strike against the management since 1936.

Chrysler Doubles Size of Mexican Plant

Fábricas Auto-Mex, S. A., assembly plant for Chrysler products in Mexico City, is enlarging assembly facilities by addition of a new building which will virtually double present plant capacity. The new wing, measuring 98 by 826 ft, plus an additional bay of 49 by 118 ft for paint storage and mixing, will be devoted to building all trucks and a part of passenger car requirements. The addition incorporates the latest developments in assembly plant construction and equipment. Assembly lines will be operated with the latest power conveyors.

Federal Mogul to Make Silver Bearings

Federal Mogul Corp. is placing orders for a half million dollars worth of machinery and equipment to manufacture silver bearings to be used for military engines, principally for large power plants used in tanks. The work will be carried on at the company's Detroit plant in space made available by rearranging existing machinery. During World War II Federal Mogul was a large producer of silver bearings for aircraft engines.

OPS Amends Machinery Price Rules

Resellers of machinery and related manufactured items will find assistance in price determination in a recent amendment to Ceiling Price Regulation 67. Aware of the hardship caused by a 30-day wait in putting new ceiling prices into effect, Office of Price Stabilization offered the following solution: resellers may use their ceiling prices established under the General Ceiling Price Regulation or Supplementary Regulation 29 while awaiting OPS approval of altered prices. A reseller who has never established a GCPR ceiling price may use the price he has applied for. However, he may not accept payment for more than 75 per cent of the new price before he gets OPS approval.

Manufacturers of machinery and related goods now may work out their own plans for computing material cost increases and submit them to Office of Price Stabilization for approval. Those

1951 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1951 Seven Months' Totals.

MAKE	July 1951	June 1951	July 1950	SEVEN MONTHS			
				Units		Per Cent of Total	
				1951	1950	1951	1950
Chevrolet	32,403	32,621	46,949	214,324	231,893	35.73	36.87
Ford	29,240	22,161	30,900	148,305	176,426	24.73	29.12
Dodge	8,448	9,347	9,155	63,686	46,717	10.62	7.45
G. M. C.	8,310	8,691	9,864	60,634	61,888	10.01	8.28
International	8,285	8,943	16,130	61,248	66,180	9.87	8.96
Studebaker	2,604	2,574	4,674	18,144	27,438	3.92	4.37
Willis Truck	1,044	1,130	1,710	8,146	7,622	1.52	1.25
White	968	1,071	989	7,720	8,064	1.23	.86
Mack	767	746	678	6,503	6,296	1.00	.94
Willis Jeep	760	777	721	6,249	4,680	.87	.76
Diamond T	363	384	499	2,892	3,130	.46	.80
Divco	264	304	332	2,451	2,137	.40	.34
Reo	238	308	297	2,240	1,626	.37	.29
Brockway	142	136	185	1,488	1,152	.24	.18
Autocar	171	165	180	1,332	1,153	.22	.18
Federal	62	63	180	680	763	.11	.12
Pontiac	66	62	126	462	1,032	.08	.16
Kenworth	54	56	69	421	326	.07	.08
F. W. D.	36	31	27	298	161	.05	.03
Starling	33	27	32	221	200	.04	.03
Peterbilt	25	9		189		.03	
Mart. Domestic	94	103	153	896	1,035	.15	.16
Mart. Foreign	18	14	18	138	230	.02	.04
Total—All Makes	84,621	87,461	117,040	589,995	617,466	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE INDUSTRIES

who choose may submit the proposed methods without actually having calculated ceiling prices thereby. They are forbidden to utilize their plans until OPS gives written approval. The federal agency offered this alternative to four standard methods for determining cost of materials. These methods, contained in both Ceiling Price Regulations 22 and 30, are varied enough to apply to all but exceptional cases, OPS said. Authority to use a substitute method was covered in Amendment 26 to CPR 22, and Amendment 14 to CPR 30.

Int'l Nickel Completes \$17 Million Expansion

The International Nickel Co. of Canada Ltd. has completed simultaneously two projects: A new shaft and a new concentrator at its Creighton Mine—involving total expenditures of \$17 million. The new shaft brings to 13 the number of operating shafts in International Nickel's underground mines in the Sudbury District. The new mill, which concentrates ore before transportation to the smelter at Copper Cliff, has a capacity of 10,000 tons a day. The additional underground ores will serve as replacement of open pit ores and will enable the company to

continue refined nickel production capacity at the present rate of about 250 million lb a year. The two projects are now in full operation.

NPA Amends Foundry Resmelting Rules

National Production Authority has amended M-22 so as to permit foundries to remelt certain of their own materials including defective, rejected or obsolete castings. Definitions have also been broadened and aluminum scrap can now be used by anyone qualifying as a producer, fabricator, smelter, or reclaimer. Previously, use was limited to specifically named firms. Accumulations must be disposed of every 30 days or when a carload lot is obtained.

California Hot Rods Must Have Fenders

Hot rods must now have fenders in California. According to a new law in the state, all vehicles are now required to be equipped with fenders, flaps, covers or similar devices, when operating on the highways. Only exceptions are vehicles weighing less than 1500 lb, and those not requiring registration.

Bendix Develops New Power Brake System

Bendix Products Div. of Bendix Aviation Corp. has developed a new power braking system that uses a treadle control similar to the conventional accelerator treadle. It will be used on one or more 1952 passenger cars. Bendix says that position of the brake treadle is such that the driver may move from the accelerator to brake in 25 per cent less time, resulting in stopping the car in five feet shorter distance at 60 mph. The device, called the Treadle-Vac, has been under development for several years and consists of power cylinder, a piston with a built-in control valve, and a hydraulic section including a brake fluid reservoir. The unit is mounted on the engine side of the toe board with the operating treadle pivoting from the firewall in the driving compartment. Treadle pressure is transmitted directly to the power unit through a rubber protected rod. The hydraulic section consists of a combined master and slave cylinder and a stop light switch.

Research Conference Held at Univ. of Michigan

The Fifth Annual Conference on the Administration of Research was held at the University of Michigan, Ann Arbor, late in September. One of the subjects of major interest discussed at the time was that of operations research for the guidance of management. Other topics included the research and development program for defense, the function of public relations in research management, and manpower as a problem in research administration.

Automobile Old Timers to Meet in Detroit

More than 1200 former and present prominent figures in the automotive industries will attend the Automobile Old Timers 12th annual dinner in Detroit Oct. 4. It will be the first time that the organization has held its meeting in Detroit, since customarily the event is held in New York City. Principal speaker will be Paul G. Hoffman, head of the Ford Foundation. Citations for distinguished service in the industry will be presented to William B. Slout, inventor and designer; P. W. Litchfield, president of Goodyear Tire & Rubber Co., Wilbur Shaw, president of the Indianapolis Speedway; Earle C. Anthony, pioneer West Coast automobile dealer, and William L. Mallon, past president of NADA.

BIG ONE

The Cadillac Cleveland Tank Plant's largest manufacturing unit, a Wean multiple-head automatic machine, grinds mounting surfaces for suspension assemblies on the underside of the tank hull and does the job in just five per cent of the time formerly required. Complete with banks of hydraulic and electrical controls, it weighs 350 tons, not including its concrete mounting base. Built by the Wean Equipment Corp. of Euclid, O., it is said to be the first completely automatic adaptation of a bank of grinding heads to work on an angular surface. Grinding of the suspension pads, formerly had to be done one at a time on a horizontal boring mill. The Wean machine grinds all ten surfaces at the same time, and eliminates the possibility of human error in controlling the grinding head. The machine is so big that operators control it from catwalks built over the unit. To load the machine, these catwalks are hydraulically lifted up and swung away from the grinding heads. A tank hull is then lowered onto four mounting brackets, positioned and locked in place. The catwalks again swing into position and the automatic grinding cycle begins.



Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Mack Trucks, Inc.—G. F. Jones has been elected vice president of Mack Manufacturing Corp., Mack Motor Truck Corp., and Mack Motor Truck Co.

Ford Motor Co.—Arthur J. Wieland, general manager of the International Div., has been named vice president.

United States Rubber Co.—H. Gordon Smith has been named executive vice president.

American Brake Shoe Co., Southern Wheel Div.—Eads Johnson, Jr., has been appointed executive vice president.

Willys-Overland Motors, Inc.—Gerry E. Lyons has been named general sales manager. Cornelius F. Gundlach, Jr., has been appointed manager of the parts and service departments for the Willys-Overland Export Corp.

Allis-Chalmers Manufacturing Co.—W. G. Scholl was named vice president in charge of sales for the tractor division; C. W. Schweers was named vice president in charge of sales for the general machinery division; J. F. Roberts was named vice president in charge of engineering for the general machinery division; and W. A. Yost was named a vice president of the general machinery division. G. F. Langenohl was elected treasurer and appointed assistant secretary. N. D. Johnson, assistant secretary, will continue to serve in that capacity and assume additional responsibilities as assistant treasurer. Two new assistant comptrollers are E. J. Dietrich and T. D. Lyons.

Dow Chemical Co., Madison Div.—J. P. Doan has been named superintendent of extrusion operations, Magnesium Dept. Herbert A. Clouet has been made maintenance superintendent.

Texas Engineering and Manufacturing Co., Inc.—Don Balfour has been appointed factory manager.

Landis Tool Co.—S. A. Angotti has been appointed assistant secretary.

Republic Aviation Corp.—Frederick O. Muller has been named director of procurement.

United States Rubber Co.—Wilson O. Green was named general sales manager of the Tire Division. Lawler B. Reeves succeeds Mr. Green as sales manager. J. Chester Ray was ap-



Chrysler Corp., Dodge Div. — W. C. Newberg has been named president.

Chrysler Corp., Chrysler Div. — E. C. Quinn has been appointed vice president, general manager, and a member of the board of directors.



Chrysler Corp., Dodge Div. — L. J. Purdy has been appointed vice president and general manager—trucks.



Chrysler Corp., Dodge Div. — E. C. Dock has been named general sales manager.



pointed executive assistant to the general manager.

The Cleveland Pneumatic Tool Co.—Maj. Gen. Frederick M. Hopkins, Jr., USAF (ret.) has been appointed vice president and assistant to the president.

Bendix Aviation Corp.—C. T. Zaoral, general manager of the Bendix International Div., has been named a director of Bendix-Tecnico Proprietary Ltd., a new Australian affiliate of the corporation.

General Motors Corp., AC Spark Plug Div.—Leon R. Steffen has been named director of purchases.

The General Tire & Rubber Co., Bowling Green Div.—Wayne J. Wheeler has been appointed works manager.

Seiberling Rubber Co.—C. E. Steiert has been named manager of warehousing and shipping.

Merz Engineering Inc.—L. B. Vanderhorst has been appointed sales manager.

E. A. Baumbach Mfg. Co.—Don R. Rose has been appointed sales manager.

Fairchild Engine & Airplane Corp., Fairchild Aircraft Div.—Phil Harr will serve as director of quality control; J. Earl Steinhauer, director of plant operations; and S. T. Mulroney, director of materials.

Fruehauf Trailer Co.—Francis M. Hernan has joined the company as assistant controller in charge of plant accounting.

Necrology

Frank J. Campbell, 72, automotive advertising pioneer, founder and first president of the Campbell-Ewald Co., Detroit, advertising agency, died Sept. 9, in Madras, Ore.

Bernard L. Readman, 43, advertising manager of Vickers, Inc. died on Sept. 16.

John P. Roberts, 43, assistant general manager of the Timken Roller Bearing Co., Service Sales Div., was killed in an automobile accident near Spruce Pine, N. C., on Sept. 19.

Harry W. Benton, 67, plant engineer of the Niles-Bement-Pond Co., (Pratt & Whitney and Chandler-Evans Divs.), West Hartford, Conn., died in Minnesota, Sept. 10.

George Matthews, 44, chief engineer for the Midland Steel Products Co., died recently in Grosse Pointe Park, Mich.

Clell A. Ware, 56, general foreman of the Ford Motor Co. Rouge tool and die plant, died in Detroit on Sept. 10.

William H. Baker, 65, production engineer for the Packard Motor Car Co., died recently in Detroit.

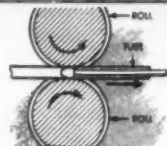
let's
take a
CLOSER LOOK
at

Surface Finishes

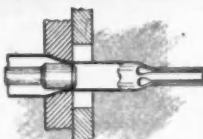


If you machine or fabricate hollow parts from tubing, chances are you have one or more *finishing* problems. Perhaps you can start finishing right in your own purchasing department by specifying the type of mill-finish best . . . and most economically . . . suited to your end-use requirements.

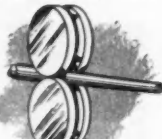
As a specialty tube mill, B&W can supply mechanical tubing with any of the following finishes—as an integral part of the manufacturing process:



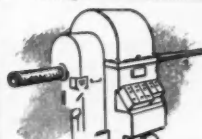
HOT-FINISHED
bears the scale formed during hot fabrication or heat treatment.



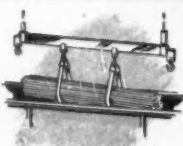
COLD-DRAWN
smooth, scale-free surface.



ROCKED
smooth surfaces, obtained by special sizing and finishing process.



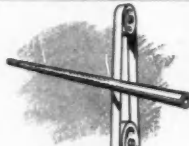
TURND
machined, uniform O.D.



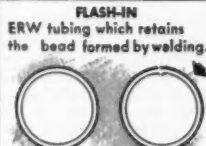
PICKLED
de-scaled by one of several solutions.



SHOT- OR SAND-BLASTED
O.D. and/or I.D. scale is removed by blasting.



POLISHED
O.D. and/or I.D. polished to one of several specified degrees of smoothness.



FLASH-IN
ERW tubing which retains the bead formed by welding.



FLASH REMOVED
ERW tubing, bead-free. Both available either as welded or normalized.

Remember—tubing is not just bar-stock with a hole in it, but a semi-finished product, having a wide range of optional finishes, tolerances, chemical and mechanical properties. Ask Mr. Tubes—your B&W Tube Company representative—to help you select the tubing best suited to your particular applications.



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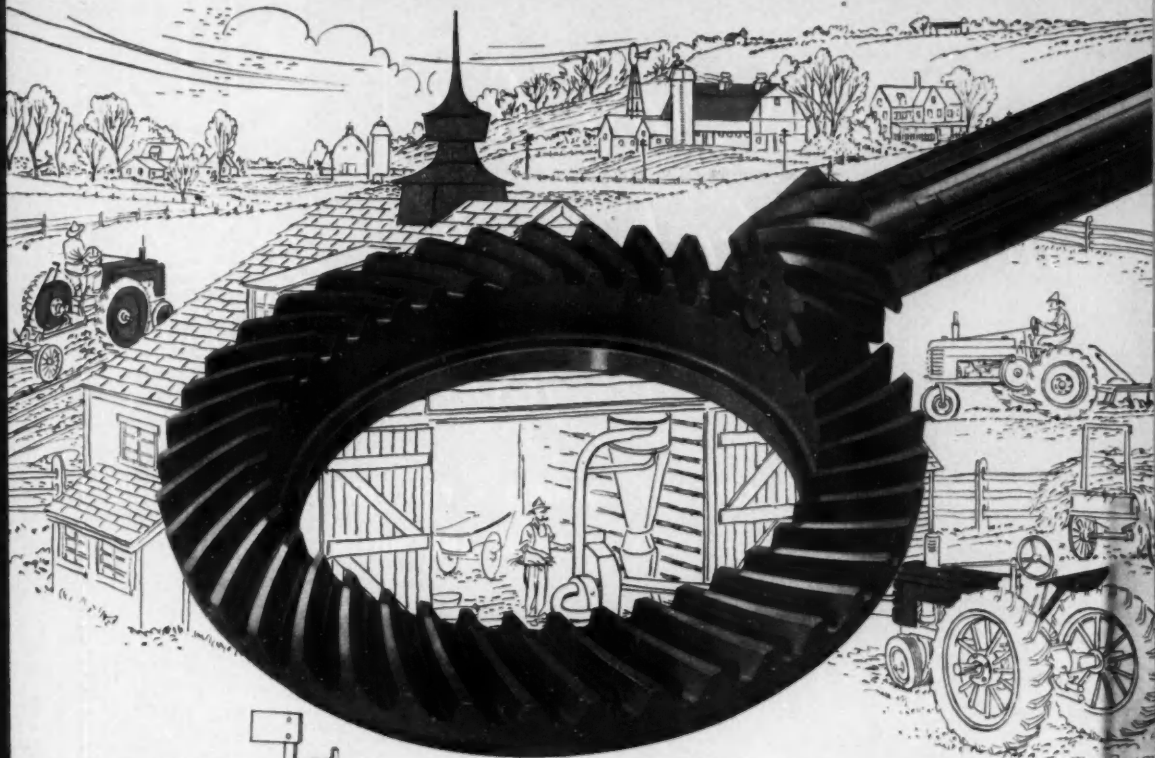
Executive Offices: Beaver Falls, Pa.

General Offices & Plants

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
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Sales Offices: Beaver Falls, Pa. • Boston 14, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver 1, Colo.
Detroit 26, Mich. • Houston 2, Texas • Los Angeles 15, Calif. • New York 16, N. Y. • Philadelphia 2, Pa.
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The enormous food production of rural America is made possible by farm machinery—machinery that multiplies man power and old fashioned horsepower many, many times.

Many makers of farm machinery use "Double Diamond" Gears. This is particularly true of trac-

tors. Making spiral bevels for leading tractor manufacturers is one of our biggest and most satisfying jobs. Big because of the volume of work entrusted to us. Satisfying because it contributes in small part to the success of the nation's mightiest enterprise—the American farm.

IMPORTANT NOTICE TO PRESENT AND FUTURE CUSTOMERS

During the present abnormal period Automotive Gear Works believes its first loyalties are due its present customers, many of whom are directly or indirectly in defense work. For that reason, every effort will be made to first satisfy the growing requirements of those companies who are already users of "Double Diamond" Gears. Where facilities or materials permit, the requirements of prospective customers will receive careful attention, and technical assistance will continue to be made available for the solution of gear problems regardless of whether or not we are now in a position to build the gears recommended.



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FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS



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STRAIGHT SPUR



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*Designed for
making fast work
of slow jobs*



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LUCAS HORIZONTAL BORING DRILLING AND MILLING MACHINES



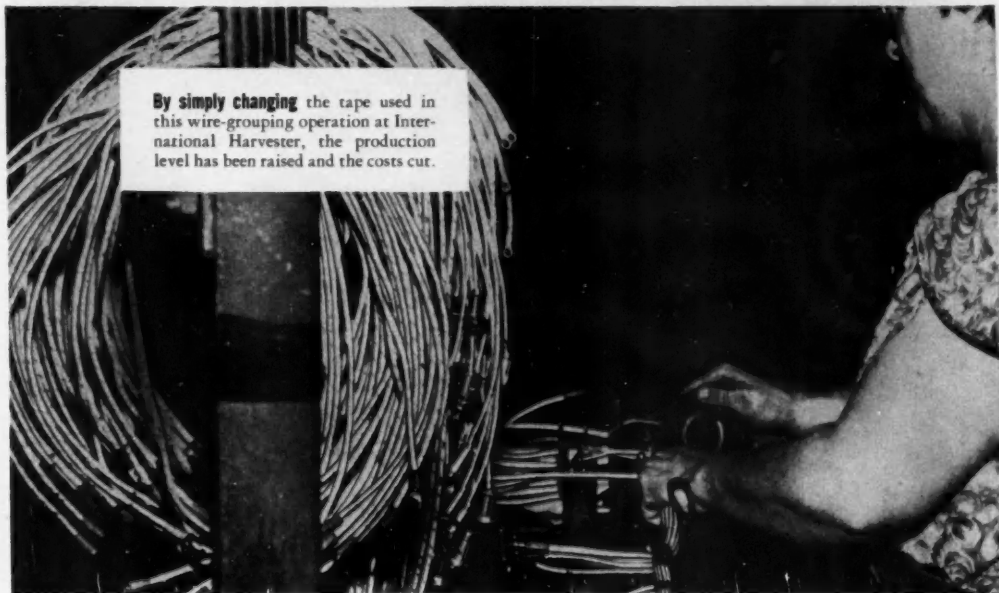
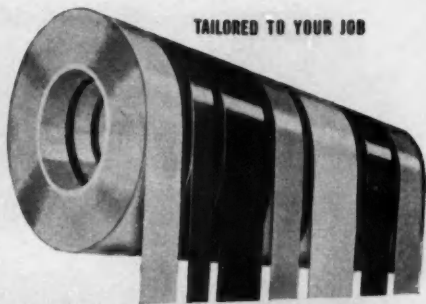
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THE NEW BRITAIN MACHINE COMPANY
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THE NEW Polyken® INDUSTRIAL TAPES

TAILORED TO YOUR JOB



By simply changing the tape used in this wire-grouping operation at International Harvester, the production level has been raised and the costs cut.

Harnessing the "heart" of the horsepower

At International Harvester Company's Springfield Works there is one operation where production has been upped approximately 10%. Simply by changing the tape used on "harness wrapping" from ordinary friction tape to Polyken Industrial Tape No. 163, International stepped up production—cut down costs.

Polyken Industrial Tape No. 163 adheres more readily to most surfaces and handles more easily. In addition, the adhesive is not messy—does not come off on the operator's hands—therefore production is kept at a constant high level.

International also uses less Polyken No. 163 than ordinary friction tape because of its high adhesion

factor. This, plus the fact that No. 163 is cheaper than many friction tapes, has resulted in the appreciable reduction in operation costs for them.

Polyken, Dept. AIK-1, 222 West Adams St.,
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For specifications and further information on this and other Polyken tapes, please send me your **FREE BOOKLET**, "Tape is a Tool."

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another of Accurate's facilities

These four slides are typical of the modern cost-cutting equipment in use at Accurate.

... that lowers the overall cost of your springs

IN the battle for lower costs, the machines of your suppliers can play a vital part. Good examples are the machines illustrated above—these four slides automatically produce intricate wire forms in an almost endless variety of shapes . . . and they do it more accurately and at a fraction of the cost of previous methods.

Machines such as these are typical of the many modern technological advancements in use at Accurate to make better springs at lower cost to our customers. And behind the machines are skilled springmakers and practical, experienced

engineers who have slashed spring costs for many spring users and who would welcome the opportunity to do the same for you. The next time you need springs, be sure to find out what Accurate can do for you.

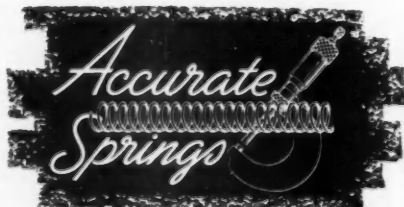
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Be sure the
springs you
buy are
Accurate



Springs
Wire Forms
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ANOTHER EXAMPLE OF MACHINING EFFICIENCY

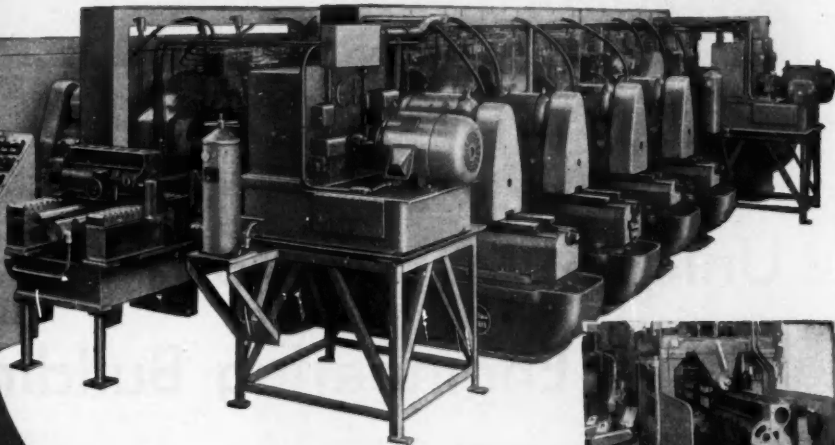
39
3
3
21
3
23
1
92

ON W. F. & JOHN BARNES 27-STATION "PROGRESS-THRU" MACHINE

● At a gross production rate of 103 cylinder blocks per hour, this 27-station "Progress-Thru" Machine handles a total of 92 machining operations in both ends of the work pieces. Oil gallery holes, $17/32$ " in diameter, are drilled the full length of each block. To cut production time, the holes are progressively drilled in different stations by 13 separate heads. Prior to tapping, holes are automatically checked for depth by two opposed hydraulically-operated inspection units. Other features include hydraulic and electrical circuits built to J.I.C. Standards, individual operating controls between stations to speed tool changes, and a built-in chip conveyor. You can depend upon Barnes to give you the latest in cost-cutting ideas and machining techniques.

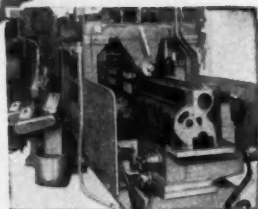


Line
front and
rear machin-
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of 34.5 seconds.



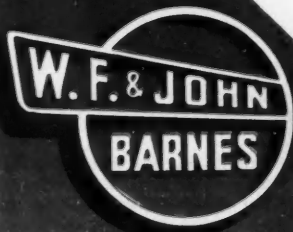
UNLOADING END ►

Block has been turned 90-degrees to feed lengthwise into following machine. Compound angular heads at left, drill two $1/8$ " holes in the front end of block, after which block is turned 90 degrees.



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MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES - AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



Interior of the radio screen room which also serves as an electrical laboratory. Equipment and instruments are arranged along the wall at the right as shown.

Unique Features of Pontiac's New Engineering Building

By Joseph Geschelin

BOASTING one of the most modern and self-contained engineering and research facilities to be found in the industry, Pontiac Division, General Motors Corp., recently raised the curtain on its new Engineering Building located on the outskirts of Pontiac. According to plans made long before the building became a reality, it was designed for the most convenient and economic management of the many functions of a modern engineering establishment—en-

gineering offices, spacious drafting room, research departments, laboratories, large machine shop area, service departments, etc.

A comprehensive air conditioning system serving the offices and drafting room already has paid dividends in comfort and improved working conditions which have had a salutary effect upon the productivity of individuals. It has a rating of 450 tons of refrigeration, and is provided with humidity control, with tempera-

(Top) Intimate view of one of the chassis dynamometer rooms. The console in the foreground, similar to others found in other test cells, was designed by Pontiac and built espe-

cially for the new engineering building. (Center) This is a portion of the extensive machine shop facilities installed in the new engineering building. A variety of equipment

makes it possible to produce parts and assemblies for experimental work and for show cars. (Bottom) View inside the cold room, showing a car under test.

ture control provided by means of zones.

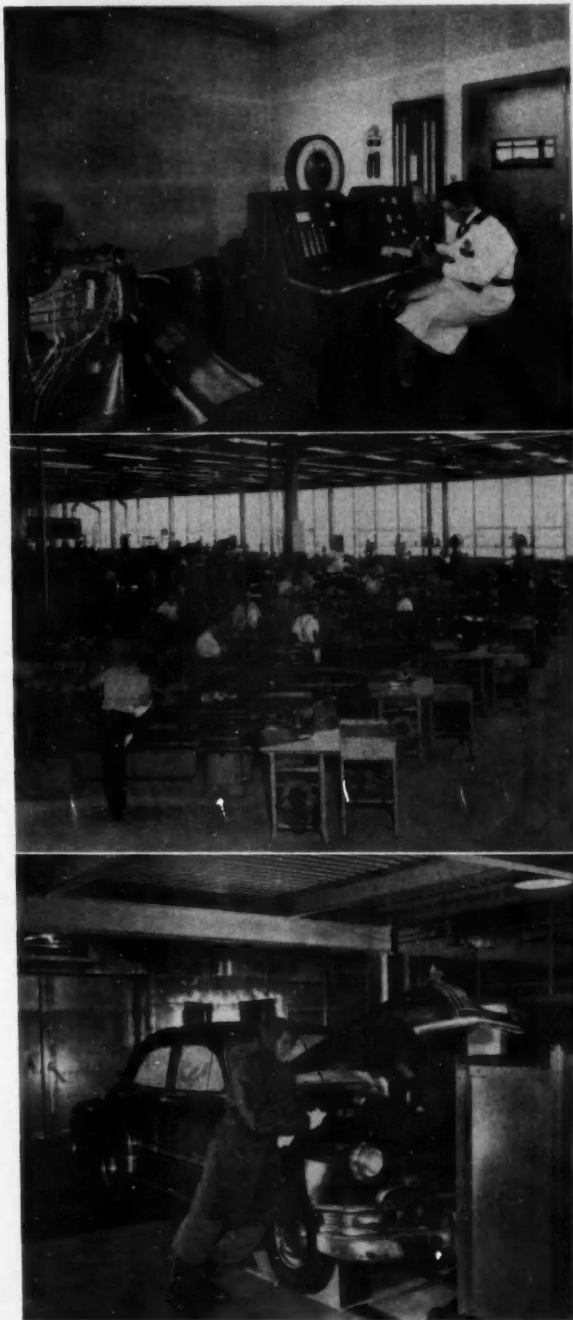
In the light of the gathering war production program it is noteworthy that before the new plant has really started rolling a goodly part of the facilities for research already has been pre-empted for handling the several major war products made by Pontiac.

Stressing modernity of design and construction, the building is of two-story type with 213,000 sq ft of floor space. In addition to the normal facilities required in an establishment of this character, the second floor area houses a large auditorium capable of seating 750 persons, with a complete stage. This is supplemented by a sizable display room large enough to house a showing of yearly car models. Too, there is a private display room featuring unique wall and domed ceiling treatment as well as an unusual lighting system designed for private showings to the management group of new models. Ceiling and lighting arrangements have been devised to provide excellent lighting without shade or glare. The lighting system for the display room provides light sources having a rating of 34,000 watts.

Model rooms and an extensive machine shop together with a well equipped sheet metal shop provide complete facilities for experimental production runs for new model work and for building complete experimental and show cars. A variety of laboratories, including chemical, metallurgy, rubber, plastics, etc., afford additional facilities for experimental production. As a matter of fact, the rubber laboratory is capable of making a variety of parts such as motor mounts, moldings, and other rubber parts for initial experimental production.

Test rooms, fitted with 200-hp capacity dynamometers, afford ample facilities for engine work, supplemented by a flow bench laboratory fitted for carburetor and fuel studies. All of the control consoles in the dynamometer rooms were designed by Pontiac and built to their specifications.

The drafting room on the second floor
(Turn to page 86, please)





Small Cars

Special Dispatch
to
AUTOMOTIVE INDUSTRIES

Custom-built Volkswagen made on special order for Haile Selassie, Emperor of Ethiopia. It is gold-trimmed and upholstered with genuine leopard skin.

A PARADE of virtual "cars in miniature," low in cost and incredibly economical in operation, set the style of the Second Berlin International Automobile Show held September 6 to 16. The United States, France, England and Italy put on display their finest achievements in big motoring. But it was Germany, once renowned for such luxurious conveyances as Maybach, Horch, and the "Fuehrer Wagons" of Mercedes, that pointed the way in the creation of a new host of small cars, which today in Europe afford the only possibility of a car in every garage.

Factories in Berlin and the Federal Republic are turning out a multitude of these four-wheeled pygmies with two and four cylinder engines, capacious and spirited enough to carry four and five passengers at speeds of 60 to 70 mph, yet holding gasoline consumption to as little as one gallon for 60 miles.

The prices are moderate, ranging from around \$900 to \$1400. This economy makes itself felt even more in greatly reduced taxes and insurance fees, and above all in fuel costs at a time when gas averages 75 to 90 cents a gallon throughout Western Europe.

There is only a small market here for American cars, represented at the show by General Motors, Chrysler, Packard, Ford, Hudson, Kaiser-Frazer and Nash. The U. S. models were certainly the royalty of the collection as far as the spectators were concerned, but the prices simply make them out of reach.

Actually on a comparative basis, U. S. cars are the lowest priced anywhere in terms of the most for the money. A plush Mercury convertible, for example, costs in the U. S. about the same as the German Opel Kapitän does in Germany.



Closeup of new four-cyl., 55 hp Diesel installed in chassis.

Dominate Second Berlin Show

The Porsche with convertible body on improved Volkswagen chassis.

**By
Richard S.
Weil**



The Kapitan, however, is a smaller version of the 1946-7 Chevrolet, and by U. S. standards certainly does not justify its price of the equivalent of nearly \$2500.

On the other hand, a Hudson Commodore 8, for instance, sells in Germany for about 24,000 DMarks, or nearly \$6000, almost four times the American price. The difference is due primarily to import tariffs, however, to produce a German version would entail a retail price practically as high because of the more expensive material and unit costs.

Taking the Hudson again, and contrasting it with one of the German gems, the sporty Porsche, one can see at a glance the divergence in the U. S. and European trends. The Hudson, powered by an eight-cylinder engine that develops 130 hp, has a rated top speed of about 90 mph. The Porsche boasts of a four-cylinder, air-cooled, rear-drive engine of 44 hp and the same 90 mph maximum as the Hudson. Maintenance and operation of the Porsche, a swanky version of the famous Volkswagen, costs about one-quarter less than that of the Hudson.

Some of the other cars emerging as Germany's and Europe's transportation of the present and foreseeable future are:

GUTBROD: a 2-3 seater resembling the Fiat Topoline in appearance. Two-cylinder; 600 cc, 22 hp engine; top speed 70 mph; 50 mpg; cost, 4875 DMarks.

GOLIATH: 5-seater, 2-cylinder, 700 cc, 24 hp; 65 mph; 36 mpg; 6,112 DMarks (sedan), 6636 DMarks (convertible).

CHAMPION: 2-seater; 2-cylinder, 398 cc, 14 hp; 57 mph; 60 mpg; 4262 DMarks.

DKW: 4-seater; 2-cylinder, 700 cc, 23 hp; 63 mph.

Gutbrod Superior model with 22 hp, two-cyl, two-stroke engine.



62 mpg; 6029 DMarks (sedan), 7729 DMarks (convertible).

VOLKSWAGEN: 4-seater; 4-cylinder, 1131 cc, 25 hp; 63 mph; 30 mpg; 4600 DMarks (Standard), 6950 DMarks (Convertible).

TRIPPEL: 2-seater; 2-cylinder, 498 cc, 18.5 hp; 73 mph; 60 mpg; 3950 DMarks.

TAUNUS: 4-seater; 4-cylinder, 1172 cc, 34 hp; 65 mph; 30 mpg; 6650 DMarks.

German industry has extended the theme of compactness and economy to an array of diminutive panel trucks and carry-alls, equally suitable for transport of freight and persons on short town trips and across-country. Especially noteworthy are the Volkswagen and DKW "Omnibuses" accommodating a driver and 7 passengers in station-wagon arrangement, or 1500 pounds of cargo. The buses are powered by the same engines as the passenger cars made by the two firms.

Among the medium and standard-size German models (still relatively small by U. S. standards) are the General Motors Opel models—Kapitan and Olympia, priced from about 6600 to 10,000 DMarks; the new Borgward 5 to 6 passenger sedans and convertibles, averaging around 8200 DMarks; and the Mercedes four and six-cylinder models from 12,000 to 19,000 DMarks.

Despite their size, the German "bugs" manage to incorporate an amazing number of relative luxury features: electric direction signals, interior illumination; genuine leather upholstery in some of the convertible models and steering wheel gearshift in a few models. All of them have luggage compartment space for tools, spare tires, and extra gas cans. Practically all have place for a built-in radio.

The German automobile industry has also come up with a number of ingenious devices to aid motorists in Europe as well as abroad. These include spark-plug caps with built-in control lamps which show automatically which of the plugs are functioning and which are dead; a "fuel-miser" that can be attached to the carburetor with proved economies, an automatic dimming mechanism which switches the lights of the car in which it is installed and those of an oncoming car.

One Berlin firm has patented a disappearing table that can be installed under the dashboard and when pulled out provides a desk surface strong and roomy enough to accommodate a typewriter. Another has devised a "headlight defense" consisting of a visor from which two dark shields drop at a nod of the driver's head when the approaching beams are too

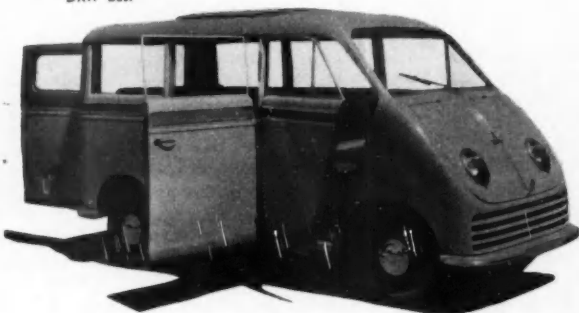
Goliath 24 hp sedan.



New DKW two-door sedan powered by 23 hp, two-cyl, two-stroke engine.



Typical of the latest designs in German small buses is this new DKW bus.



strong. Another nod and the shields disappear again into the visor. The shields are so constructed that they darken only the left side of the field of vision.

Also presented for the first time were two Diesel developments, a bicycle and new type car engine. The bicycle engine, costing the equivalent of \$39, weighs 10 pounds and can provide a cruising speed of 14 mph. The machine uses light oil as fuel, with consumption rated at one gallon for 320 miles.

On display as a latest advance in Diesel design was this new car powerplant, a 4-cylinder, 55 hp engine. Chief among its attributes are a maximum speed of 75 mph and a fuel consumption of 35 miles per gallon (*Turn to page 90, please*)

NBS Research on Basic Nature of Detonation

INCREASED understanding of the mechanism by which "knock" is produced in automotive engines has resulted from compression-ignition studies now under way at the National Bureau of Standards. This work employs a single-cylinder test engine of variable compression ratio in which a wide range of operating conditions may be simulated. Oscillograph traces showing pressure change and light emission during combustion in the test engine provide an insight into the nature of knock and can be used to correlate knocking characteristics of fuels with their chemical structure.

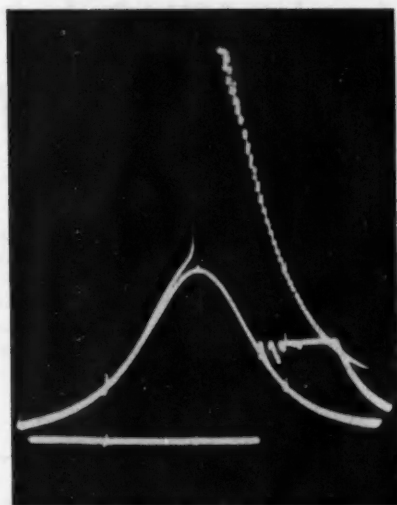
Seeking further information on the basic nature of detonation, the National Bureau of Standards is studying the conditions prevailing in end gas. To provide the necessary data, apparatus has been constructed in which the end gas is simulated. In this apparatus, a mixture of fuel and air is inducted into a single-cylinder test engine, which is driven by an electric motor. Here the piston compresses the mixture to the conditions of temperature and pressure under which autoignition takes place. The pressure in the cylinder acts on a strain gage pressure pickup which is connected through a bridge circuit and amplifier to an oscilloscope. The pressure is thus shown on the oscilloscope as a function of crank angle, or time. At the same time, the light emitted by the autoignition is picked up by a photomultiplier tube which amplifies it and makes another trace on an oscilloscope.

The engine used in the NBS studies is a modified ASTM supercharge aviation method fuel-rating engine. By removing the springs beneath the cylinder and chang-

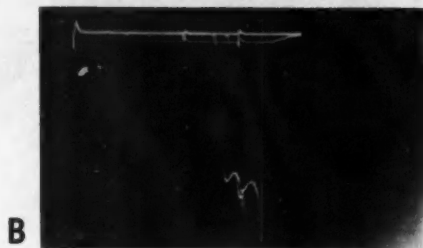
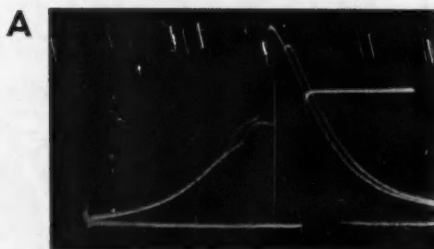
(Turn to page 84, please)

Oscillograms showing the two combustion stages in auto-ignition of the end gas as revealed in studies of engine knock. A: pressure in the combustion chamber plotted against crankshaft rotation (or piston travel). Two cycles are shown on the same axes. The first small hump in each case represents the pressure developed in the first stage of autoignition. The large increase which follows marks the beginning of the second stage, during which knock occurs.

B: light emission plotted against crankshaft rotation. The light emitted by the reaction first increases and then decreases during the first stage of autoignition. This is followed by a strong increase in light emission during the second stage. Horizontal and vertical lines are for calibration purposes. Each of the short vertical lines on the horizontal axes indicate 30 deg of crankshaft rotation.



Oscillogram of engine "knock" (jagged portion of curve, upper right) obtained within a specially constructed high-compression engine. The sinusoidal curve shows pressure changes during a normal non-burning cycle. The second curve, in which knock occurs, follows the first curve through most of the first half of the cycle; it then rises sharply in two steps as the compressed gas ignites. The first step represents the first stage of combustion; the sharp rise in pressure indicates onset of the second stage in which burning takes place with explosive violence. The resultant shock wave is reflected back and forth across the combustion space, producing the jagged, descending section of the curve. The horizontal lines are placed on the oscilloscope to show relative magnitudes.

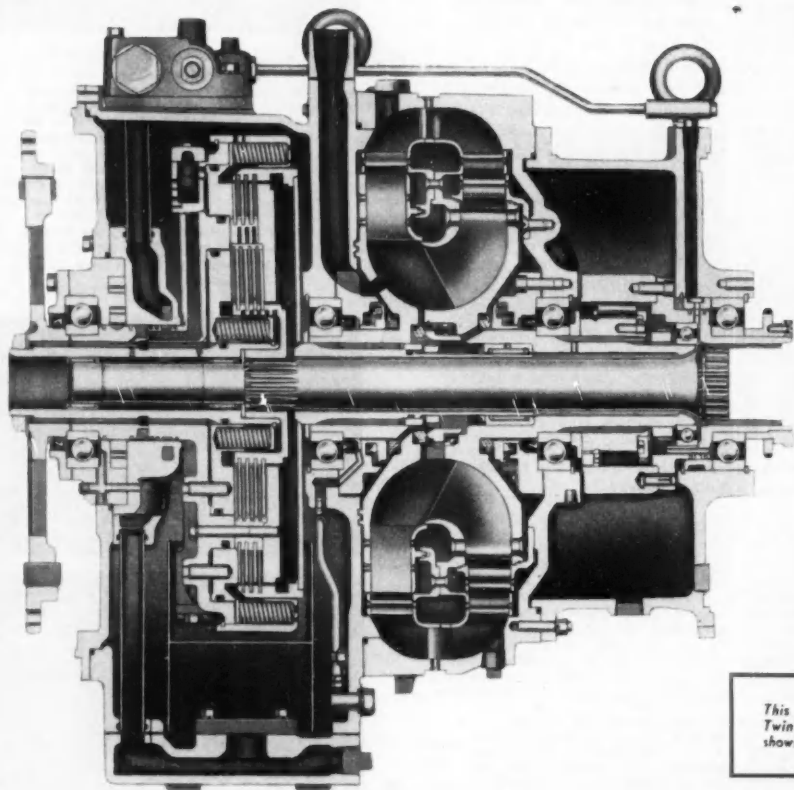


Hydraulic

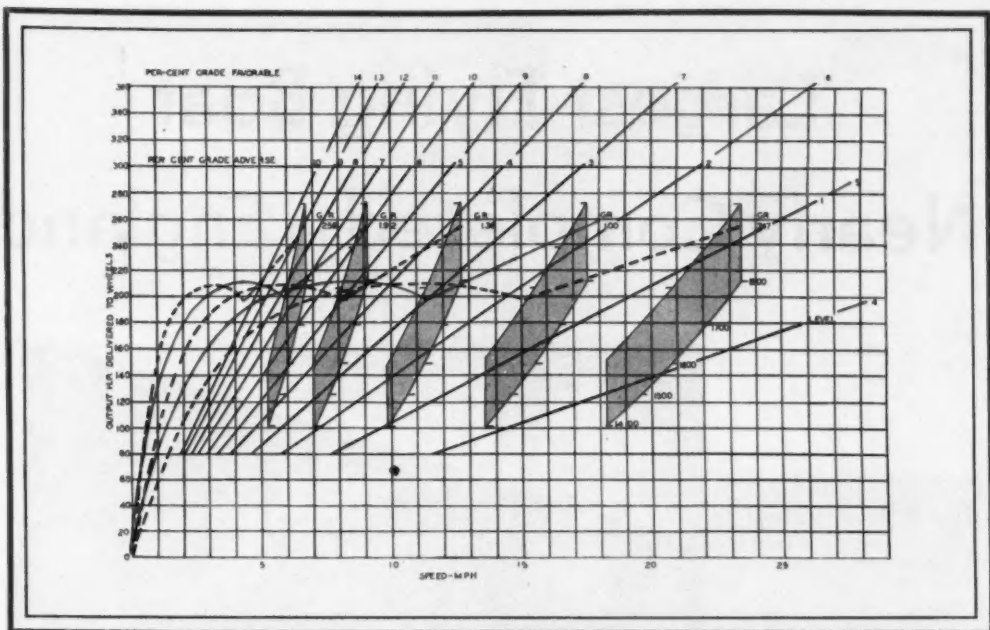
Torque Converter for Trucks *Has New Braking Method*

DESIGNED primarily for heavy duty truck operations, the latest Twin Disc Clutch Co. hydraulic torque converter incorporates a rather unique means of applying downhill braking power. This converter is of the three-stage single-phase type with a direct drive clutch, as shown in the illustration.

The hydraulic unit consists of an impeller, two reactors or stators, and three turbine elements. An overrunning clutch is used in conjunction with the turbine. This clutch, mounted on the output shaft at the rear of the unit, permits the output shaft to overrun the turbine when the torque converter is in direct drive.



This sectional view of the Twin Disc torque converter shows details of construction.



Performance of a 130,000 lb gvw truck using a Twin Disc torque converter and a five speed mechanical transmission on adverse grades is shown by the solid and dashed lines in wheel horsepower versus miles per hour. Braking energy absorbed by the converter on favorable grades is illustrated by the solid blocks. The rolling resistance was calculated to be 40 lb per ton.

For direct drive, a multiple disk, hydraulically actuated clutch is utilized. Another similar clutch is used to operate the torque converter. Operation of both clutches is controlled by means of a manually-operated valve. The control is so designed that when descending a grade the direct drive clutch and the converter clutch can be engaged simultaneously.

Conventional engine braking through the direct drive clutch is available plus the energy absorption of the impeller through the converter clutch which connects the impeller to the driveshaft, thus making available for braking purposes horsepower equivalent to the full engine horsepower.

This is illustrated in the chart which shows the performance of a truck having a gross vehicle weight of 130,000 lb and powered by an engine developing 255 hp at the flywheel at 1800 rpm. The mechanical transmission behind the converter was a closely spaced five speed gear box. Ratios were 2.58, 1.92, 1.38, 1.00, and 0.747 to one. Rolling resistance was calculated to be 40 lb per ton.

Performance on adverse grades is shown in wheel horsepower versus miles per hour. The braking energy absorbed by the torque converter on favorable grades is illustrated in terms of horsepower versus miles per hour as indicated by the solid blocks.

In a very severe field test, according to Twin Disc engineers, the converter has held a 140,000-lb gvw vehicle on a 12 per cent favorable grade for 15 miles at desired speed with minimum use of the service brakes.

• • •

First European Machine Tool Show

By W. F. Bradley

Special European Correspondent for
AUTOMOTIVE INDUSTRIES

PARIS, FRANCE

EUROPE's first machine tool exhibition, held in Paris, September 1 to 10, was an outstanding success. Last year a European co-operative committee representing machine tool industries was formed by Germany, Belgium, France, Holland, Italy and Sweden and this exhibition was the first prominent sign of its activities. Instead of the estimated 600 exhibitors, a total of 852 was reached, these being housed in three main halls, having an area of 538,000 square feet, of

(Turn to page 120, please)

Largest Flying Boat

Nearly Completed in England

By W. F. Bradley

Special European Correspondent
For AUTOMOTIVE INDUSTRIES



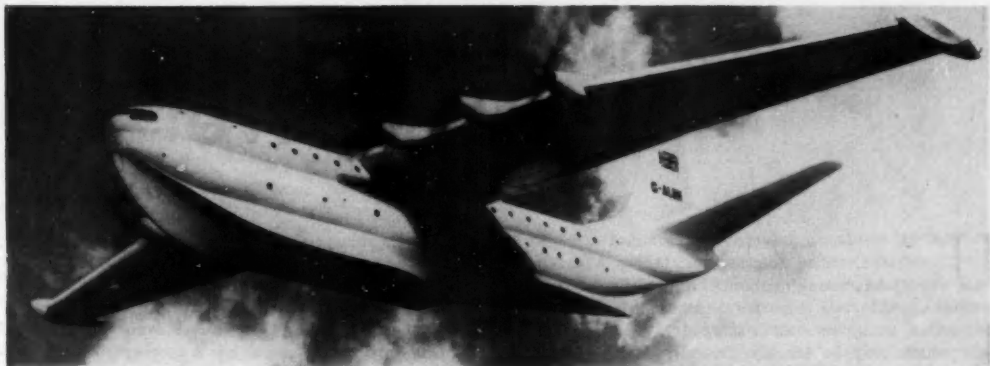
Front quarter view of the new flying boat's hull.

ORDERED by the British Government in May, 1946, with construction beginning in February, 1947, the first of the three 140-ton Princess flying boats being built in the Saunders-Roe shops at East Cowes, Isle of Wight, England, is expected to take to the air at the end of the year.

The largest craft of this type ever constructed, the Saunders-Roe planes are intended for a non-stop service between London and New York, with a stage length of 3450 miles, and a range at cruising speed of 5500 miles. This ship will allow of interesting comparisons being made with the giant landplane, the Brabazon, as the two have comparable performances. It is claimed that in overall structure weight the Saunders-Roe 45 will have an advantage of at least three per cent over a land plane of equivalent size. Apart from the popularity arising from a feeling of security attached to the flying boat—in England at any rate—the great advantage is the comparatively trifling cost of docking facilities, compared with the almost prohibitive cost of runways for landplanes. The planes operating at present from England are moored to

buoys in sheltered waters, but Saunders-Roe has developed floating pontoons and an automatic mooring arrangement. This setup consists of a retractable automatic pickup hook on the keel of the flying boat, arranged to engage with a mooring cable running from the pontoon or dock to an outer buoy or dolphin. After engagement of the hook the cable is wound in by means of a winch, and the flying boat is brought swiftly into dock.

Delays have occurred in construction by reason of successive changes in the types of engines to be used. Originally plans called for six Rolls-Royce piston engines to be used. This was changed to Rolls-Royce Clyde turbo-prop; then the Armstrong-Siddeley Python turbo-props were considered, followed by a decision to fit eight Rolls-Royce Tweed turbo-props, and finally the order was given to fit ten Bristol Proteus turbo-props, arranged as four coupled and two single units—the singles being outboard. These successive changes involved extensive redesigning of the wings, setting back the construction several months. Hull design changes were of a comparatively minor nature.



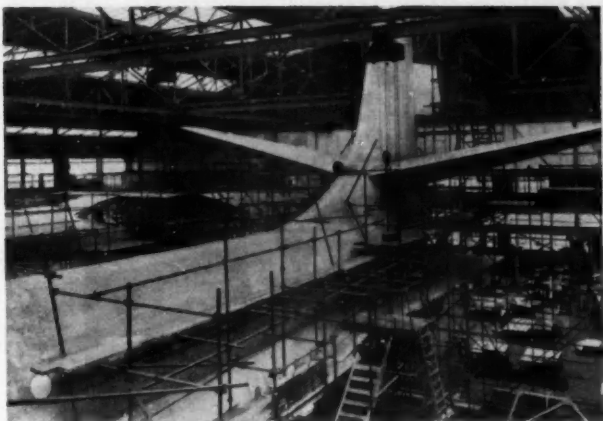
Artist's impression of the 140-ton Princess flying boat.

Overall length of the Princess hull is 147 ft, eight in., with a maximum hull depth of 24 ft, three in. Beam is 16 ft, eight in., span 220 ft, and total height 55 ft, nine in. Gross weight is approximately 140 tons. The Princess is a high wing monoplane with single fin and rudder. The hull has been designed to achieve new standards of aerodynamic and hydrodynamic efficiency, a special feature being completely retractable wing floats. A special tank, the largest of its kind in England, was built for testing hull and wing float forms and exhaustive tests were also carried out at the Royal Aircraft Establishment at Farnborough.

The hull is a single step type of figure eight construction with two decks and is pressurized up to eight psi over a length of 121 ft. The lines are not broken by the pilots' compartment in the bow, as all windows are flush with shell plating. The interior of the planing bottom, beneath the lower deck, is taken up by bulkheads attached directly to the keel, these forming watertight compartments.

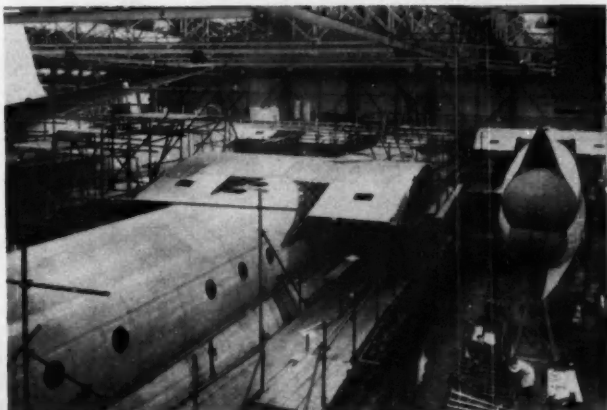
The half-buried power plants are the Proteus, manufactured by the Bristol Co., and are the same as those to be used in the commercial version of the Brabazon plane. The two inboard engines on each wing are the coupled type, and the out-

(Turn to page 116, please)



This view of the huge single fin and rudder of the Princess flying boat gives some impression of the craft's size.

Workers are dwarfed by units of the plane in the plant of Saunders-Roe.



Automotive and

USE of welded or riveted sheet metal for the construction of automobiles, trucks and aircraft has brought about the need for a great number of materials to perform several functions in connection with the metal structure. These materials which may be loosely grouped together in a single classification are called sealers or sealants, the latter term being used in the aircraft industry. Physically they are much alike, having the common properties of a degree of flexibility, excellent water and weather resistance, a degree of fluidity in the "as applied" state, and good adhesion. Chemically, most automotive sealers are asphaltic and natural or

reclaimed rubber. The aircraft industry uses synthetic rubber types almost exclusively because, in addition to weather and moisture, they must generally be resistant to fuels, hydraulic oils of several types, engine oils, and various solvents used for cleaning. Instead of requiring a temperature range of approximately -20 F to 180 F (up to 350 F for short braking periods) as in automotive use, aircraft requirements are as low as -100 F and up to 500 F.

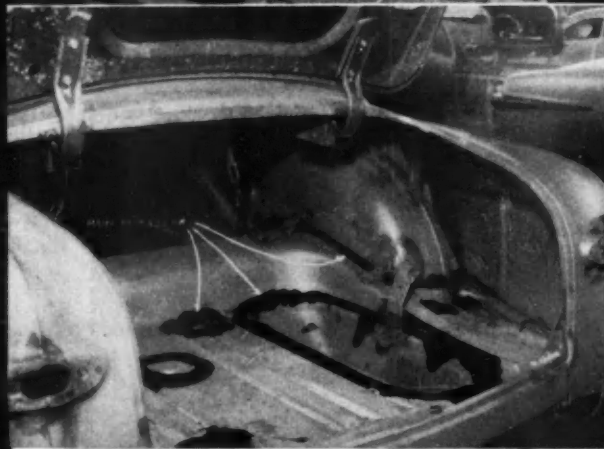
Sealers for automotive use serve several different functions, but one preparation may sometimes be used for several purposes. Functionally, the materials may be classified as follows: (1) Sealers against



(Left) Sealers are applied by spray gun, caulking gun, and brush to the floor pan. Instructions on this factory photograph indicate method and material to be used in production.

(Corner) Moisture, fumes, and dirt are kept out by sealers applied to metal seams.

(Below) Spraying sound insulating material under fenders before installation of front suspension system.



Aircraft Sealers

water and/or air. (2) Corrosion-resistant coatings. (3) Sound deadeners (vibrations or squeaks). (4) Heat insulators.

When used as a true sealer against water or air, the viscous liquid may be applied to spot-welded metal seams to keep rain out of the car interior, or to seams in the floor pan of the car to keep out exhaust gases. In aircraft, the sealing of seams in the cabin walls has made possible the development of the pressurized cabin, making high-altitude flying more comfortable for passengers and crew. The light-gage steel used for automobile bodies requires all-over protection against corrosion if it is to have a reasonable life, and the thick liquid sealers retain enough flexibility after drying to prevent their chipping or cracking under any ordinary service. As sound deadeners the sealers are applied to large metal areas to reduce vibration, or to metal-to-metal contact areas to prevent squeak. The underside of the car roof makes use of a coating of sealer to reduce the amount of solar heat transmitted to the interior of the car, in addition to its serving as a vibration deadener and protection against corrosion.

Sealers may be applied by brush, knife, spray gun, or caulking gun, and, in aircraft, by the fill and drain

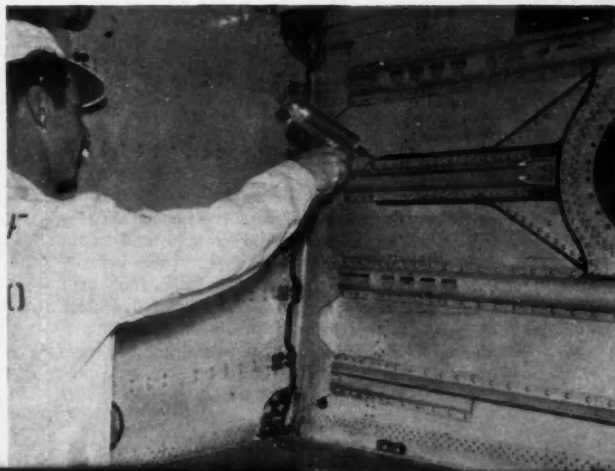
method. Consistency must be adjusted to the method of application, with due consideration to the drying requirements of the job. The asphaltic sealers may be thinned with many of the low-cost petroleum hydrocarbons or with aromatic solvents, while the synthetic rubber based sealants require many more expensive solvents according to type. Solvents of the Ketone and ester types are used for vinyl, lacquer, and Buna N sealers, aromatic types are used for Butyl and Neoprene, while chlorinated hydrocarbons are required for Thiokol or polysulfide polymers.

Points of application in the automobile body include spot welded joints at many locations, hinges, handles, moldings, and numerous other joints and fittings. The material is applied to instrument panel attachments and to instrument installations as a squeak silencer, and to the inside surfaces of all metal panels as a sound deadener, corrosion protection, and heat insulator. An underbody coating is used on the undersurfaces, especially on the fenders, as a protection against water, dirt, and stones. Some of the body-sealing compounds are so formulated that they will swell and cure with the heat in the paint-drying ovens.

In addition to these sealers applied to the
(Turn to page 108, please)

(Right) Tank seal compound being applied to access cover plates of Constellation wing fuel tanks at Lockheed. Heat for curing the compound is supplied by infra-red lamps.

(Below) Applying sealing fillets to center wing integral fuel tank of a DC-6 at the Douglas Aircraft Co.



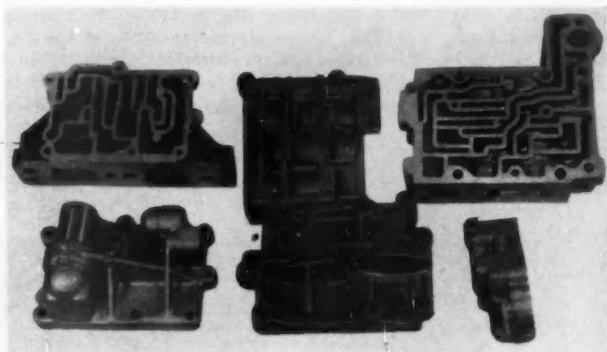
Fewer Aluminum Parts in Ford Automatic Transmission

This is the Fourth in a Series of Articles Devoted to Production of the Ford-Mercury Automatic Transmission. Another Article Dealing with the Making of Gears and Pinions for the New Transmission Will Appear in an Early Issue of AUTOMOTIVE INDUSTRIES.

By Joseph Geschelin

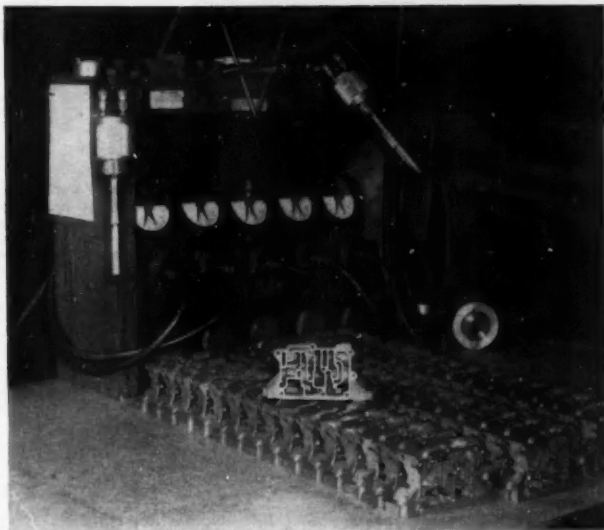
IN recent months the variety of aluminum parts going into the construction of Ford-Mercury automatic transmissions has been reduced to the point where aluminum is used mainly for hydraulic control parts such as the valve body, valve covers and other related parts. The major parts of this kind produced by Warner Gear Div., Borg-Warner Corp., Muncie, Ind., are shown in the group photograph. Although the parts are small they present a serious problem of control in machining due to the requirements of precise alignment of related parts and the need for extremely fine dimensional tolerances. Superimposed on this is the need for flat, square surfaces of valve faces to permit perfect sealing of hydraulic pressures ranging upwards of 180 psi. This requires a succession of face grinding and lapping operations of meticulous nature.

The aluminum department is replete with Ex-Cell-O precision boring machines for finishing the large variety of large and small bores. A noteworthy feature of finish-boring the various ports is that the job is done with cemented-carbide reamers rather than conventional boring bars and flycutters.

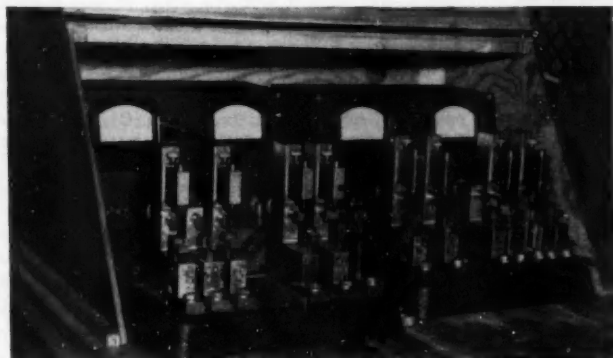


Here is a sampling of aluminum die castings for the valve system of the Ford-Mercury automatic transmission.

A brief summary of the operations required on one of the parts—the lower valve body—should suffice to give some idea of the task since similar parts are subjected to about the same kind of treatment. On this part the two large joint faces are rough—and finish-faced in a No. 54 Ex-Cell-O double-end precision-boring machine. An Allen four-position index table drill then does the rough- and finish-reaming of five holes and tapping of one hole in the mounting face. This is followed by finish-facing of the two small joint faces—



The multiplicity of bores in valve bodies are checked for dimensional accuracy by means of Pratt & Whitney Air-O-Limit gages such as the group seen in this view.



This is a close-up of several of the new Graham-Mintel electronic gages recently introduced at Warner Gear for the inspection of spools and other cylindrical parts used in the transmission control system.

and it is done at 90 deg to the large joint faces.

A Leland-Gifford deep hole drill is used for drilling seven small diameter holes in various depths, one of the holes being 2 23/32 in. deep. A five-position index Allen drill drills through webs in two sections; reams the oil valve holes, drills three small holes, and taps nine holes. An Allen eight-position index drill does end milling, drilling and rough- and finish-reaming of several holes. In addition to some minor drilling operations, another Allen drilling and tapping machine

of special design does the drilling and tapping of five holes.

Burrs then are stoned from the locating face, the work is washed, then is presented to an Ex-Cell-O double-end precision boring machine for finish-reaming of valve holes from each end. This is done in a six-station trunnion fixture. The work is washed again, has three holes tapped in the joint face, then the valve holes and webs are blown clear. At this point the work is grit blasted to remove burrs, using a Pangborn Tablast machine. This is followed by additional burring to remove fins and flash.

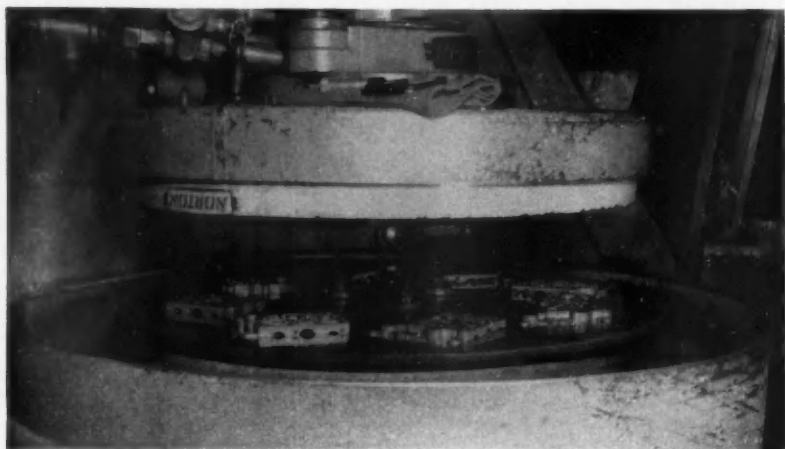
All parts are given an anodizing treatment prior to grinding and lapping. To this end parts are degreased, rinsed and sprayed, anodized, go through two more rinse and spray stations, then hot rinse, blow and dry.

The two large joint faces now are lapped to precise flatness in a No. 26F Norton vertical Hyprolap machine. Using these finely lapped faces as a guide, the two small joint faces, at 90 deg to the large faces, are ground square in two settings in Thompson surface grinders.

The work then is washed in gasoline, blown, the four joint faces brushed to remove lapping and grinding burrs, washed and blown again.

Some of the smaller parts are hand-lapped in Norton lappers but all parts of this type are lapped, then ground to provide an absolutely right-angle relationship of joint faces. Another problem is that of checking the large joint faces of flatness. These parts, as illustrated, are so honeycombed with ports and holes and bores that conventional inspection devices will not suffice. Consequently, each part is checked against a surface plate, the work being blued to indicate error, if any exists.

It is of interest to find that Warner Gear has equipped the Thompson grinders with Delpark filters which are said to do an exceptional job of removing dirt and grit and fine aluminum chips and particles. A feature of this filter is the expendable roll of special filter paper which is spread above the filter element. All of the cutting fluid drops onto the filter paper, the fluid being allowed to filter through while the chips and dirt remain on the paper. (Continued, next page)



Close-up of work station of one of the Norton Hyprolap machines used by Warner Gear for lapping flat faces on valve bodies.

Statistical quality control has become an important adjunct of inspection and manufacturing at Warner Gear. Control charts are evident throughout the machine shops with current emphasis being placed on the more difficult jobs where close control is imperative. Averages of samples of work are made directly at the machine by an inspector and posted on the chart for the benefit of the operator.

Having a very extensive gear operation, including not only automatic transmission production but other types of transmissions as well, Warner Gear not only operates a comprehensive gear laboratory but has a group of some 11 small gear inspection booths located at strategic points. By this means it is feasible to control all gear operations directly from a local-inspection point without overloading the gear laboratory. Moreover, these facilities leave the gear laboratory free to handle research and development, and trouble-shooting.

Generally speaking, control of quality is achieved by various means all dovetailing together. Basically, inspection is responsible for accepting all new setups and

rechecking whenever tool changes are made. During normal operation the operator is charged with the responsibility for his own machine and is provided with the necessary inspection equipment and instruments. This is supplemented by bench inspection as well as floor inspection on a sampling basis. It is of interest that all holes and bores are checked with air gages such as the P & W Air-O-Limit gage.

One of the outstanding pieces of inspection equipment and of recent origin is the small electronic gage made by Graham-Mintel Instrument Co. Illustrated here is a setup for inspecting valve spools having a multiplicity of stepped diameters which must be held within 0.0005 in. As shown, the gaging head is fitted with carbide-lined anvils. The machine has direct reading gages graduated in tenths of thousandths of an in.; and can be calibrated to read in millionths of an in. if desired. The gaging head is so arranged that as the spool is rolled, the instrument reads both diameter and concentricity as well.

Dimensional Control Required for Some Selected Transmission Parts

1. The pump face on the transmission case, a counterbore in cast iron, is held flat to 0.0005 in. convex.
2. The regulator face on the transmission case is held to 0.0003 in. for flatness with surface finish of 30 microinch (rms).
3. Holes for pinion shafts in the cast iron planetary cage are held to 0.0005 in. on diameter and 0.002 in. for spacing the six holes.
4. Holes in planetary pinions are held to 0.0005 in. on the diameter.
5. Bore in the cast iron oil collector is held to 0.0008 in. on diameter with surface finish of 30 microinch.
6. Shafts for planetary pinions are ground to 0.0002 in. on the diameter with a surface finish of five-microinch.
7. Various flat surfaces on aluminum valve body castings are held flat within 0.0003 in. with surface finish of 30 microinch.
8. Steel plates covering the surfaces of valve bodies are held flat to 0.0005 in., parallel within 0.001 in., with surface finish of 20 microinch.
9. Ground diameters on various valve spools are held to 0.0005 in. with surface finish of 15 microinch.
10. Each of the three steps in the deep hole in the sun gear is held to a tolerance of 0.001 in. on the diameter.
11. Planetary gears are held to a lead tolerance of plus or minus 0.0003 in. while involute form is held to 0.0003 in.

Progress Report on the Coal-Burning Gas Turbine

THE objective of the Bituminous Coal Research, Inc. Locomotive Development Committee program has always been to produce a coal-burning gas turbine locomotive which could be used to demonstrate the feasibility of this kind of power plant. After the first year of the program, the committee felt that there was enough hope of success to warrant the purchase of a full-scale gas turbine. Contracts were placed with both Allis-Chalmers and Elliott for the construction of 3750 hp locomotive-type turbine plants with traction generators and all necessary control equipment.

In the fall of 1950, enough experience had been accumulated with the Houdry turbine to justify the belief that the locomotive turbines could safely be operated on pulverized coal. Acting as always on the optimistic assumption that the problems would be solved as they arose, full-capacity coal-handling equipment and a pulverizer were purchased. Erection of a test plant was undertaken, in a suitable building made available by the Alco Products Div. of American Locomotive Co.

The coal preparation equipment is designed to fit within the space limitations of a locomotive. Original specifications for the first experimental loco-

*By John I. Yellott,
Peter R. Broadley
and Frederick D. Buckley*

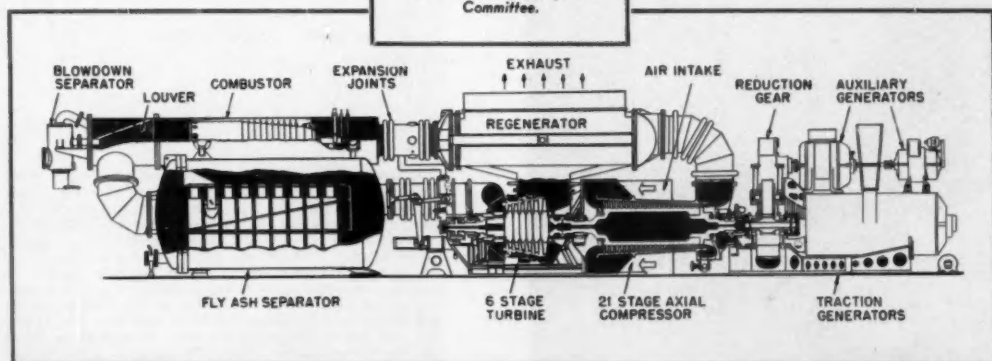
motive called for equipment which could take aboard run-of-mine coal, dry and pulverize it, and feed it under proper control to a variable-speed gas turbine.

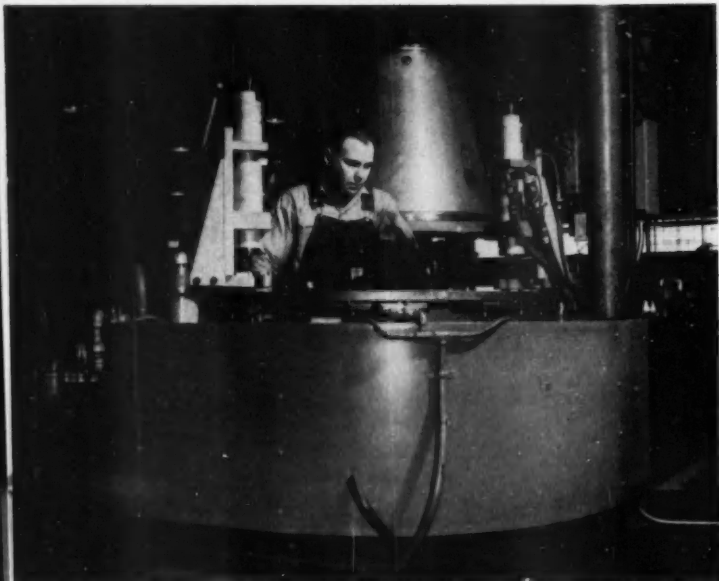
Coal, delivered from the bunker by a special stoker, is carried towards the rear of the stoker by a two-level screw and crushed to two in. lumps by the conventional breaker plates. The crushed coal is then dropped into two parallel ribbon-type screws which move it forward through the drying section. Hot air from the turbine exhaust passes at low velocity through the drying sections, moving countercurrent to the coal. Twin elevator screws lift the crushed and dried coal to a storage tank located between the bunker and the pulverizer.

Coal is delivered from the crushed coal storage tank to the pulverizer by a transverse screw which is driven by a two-speed a-c motor. This motor will also change speed in proportion to turbine speed, but the mill level controller will start and stop the motor through suitable switch gear.

The pulverizer is a two-row mill, rated to deliver about 4500 lb of 90 per cent 200 mesh coal per hr (grindability not lower than 50 Hardgrove). The mill
(Turn to page 106, please)

Allis-Chalmers locomotive-type gas turbine power plant with combustion and ash removal equipment which was developed by the Locomotive Development Committee.



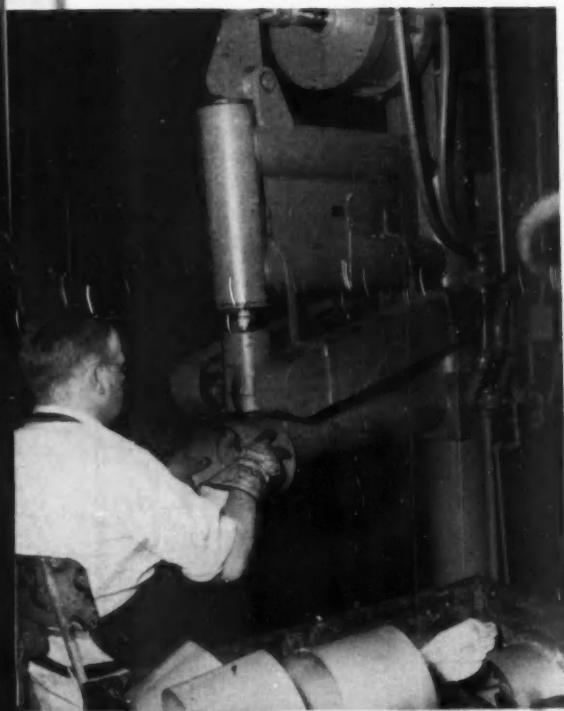


Precision drilling of the 160 bolt holes in the flanges of the General Electric J-47 jet engine exhaust cones is accomplished in a fraction of the time normally required by means of several Ryan-built drill jigs now in use. These accurate tools drill the bolt holes in the cone assemblies in just 80 minutes.

Each drill jig consists of a precision-made steel tool which rigidly holds the General Electric component while a pair of Keller Airfeeddrills cut through the 1/2-in. stainless steel flange. After the cone assembly is locked in the jig, the drills are pivoted into position in such a way that their cutting bits are exactly located as required by engineering specifications. The hole pattern for these bolts must be accurate within 0.010 in. radially. Hole size tolerance is plus 0.004 in. and minus 0.001 in.

A single valve is pressed by the operator to drive the air-powered drills which start simultaneously, cut through the tough metal and return to their starting position without supervision. The automatic return is individually controlled by special preset air valves which go into action when the drill bits have penetrated to the required depth.

New Time Saving Machines



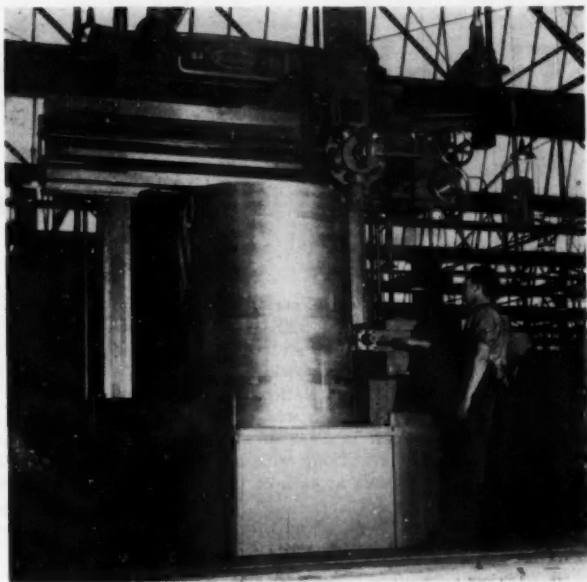
By employing some of the newest and most efficient equipment available, the Ryan Aeronautical Co., San Diego, Calif., has not only reduced the time required for numerous operations in the production of plane and engine parts, but has improved the finish and accuracy of the workpieces. Illustrated here are some of the recently acquired machines which are now in operation at this west coast plant.

This special seam rolling machine, designed and built by Ryan's Plant Engineering Department, is used to flatten the Heliarc welded seams of stainless steel exhaust sections. Formerly, these parts were welded with filler rod added and the resultant bulge of metal at the seam was ground away by hand, using a power-driven grinder. With the new seam roller, it is possible to weld the sections by Heliarc without using any filler metal. This provides less excess metal to be removed. The welded sections are placed between two steel rollers in the machine and the heavy pressure of the rollers flattens the weld seam and improves the weld quality by refining the grain structure of the metal. Only a few seconds are required to run each section through the machine.

The vertical turret lathe shown here has the highest boring mill with raised bed ever installed on the Pacific Coast.

The new machine—13 ft high and weighing 32 tons—is an immense Bullard Cut Master, called "Hi Boy" in deference to 24 extra inches of height for its bed as compared to the standard vertical Bullard. The latter bed places the 64-in. diameter turning table in the most advantageous position for accomplishing specialized machining on unusually tall parts. Metal sections measuring from 1/2-in. to just under seven ft. in height are turned with ease.

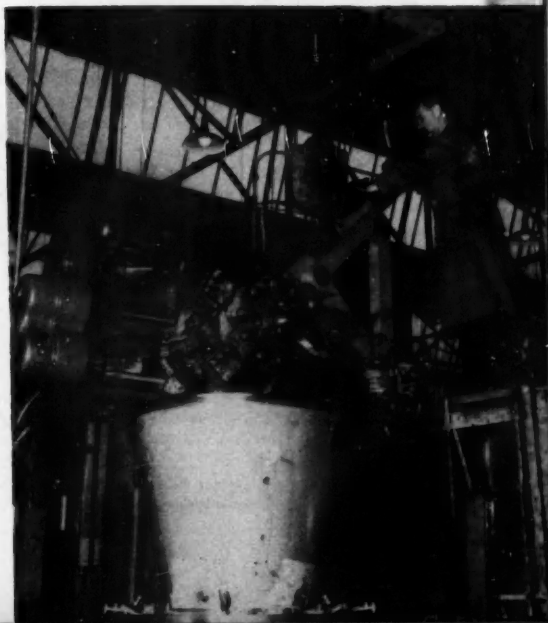
It is estimated that, on the basis of first job runs, production on items such as the 48-in. aluminum rings for external fuel tanks will be stepped up 25 per cent over previous methods. Similar increased production rates are anticipated on steel cones, aft frames and other jet engine parts.



First of its particular type to be used by Ryan, this horizontal boring, drilling and milling machine is a product of the Giddings and Lewis Machine Tool Co. of Fond Du Lac, Wis.

Designed with an unusually large bed and open-type structure, it is especially suited for handling large, unwieldy and odd-shaped castings or fabrications. With its wide flexibility, it can be efficiently used on single pieces, short runs or quantity production. For instance, formerly it took approximately 40 hours work to drill and bore the exacting positioning holes in the General Electric J-47 jet engine tools for the tail cones. Drill points had to be located by hand, using temporary drill templates and a calibrated scale because of the large size of the tooling. Now, the G. E. tool is placed in the new machine and holes are located and drilled using the fine precision scales of the machine itself. This has reduced the time for this operation from 40 to eight hours.

A new high-production machine, capable of stepping up machining speeds, simplifying set-up procedure and improving surface finish, has been installed on the big Bullard vertical turret lathe in Ryan's Jet Assembly Department. Called a Turchan Hydraulic Duplicator, this device converts the vertical turret lathe into an automatic production tool with outstanding time savings. The duplicator incorporates a motor-driven hydraulic pump which supplies uniform oil pressure of 500 psi to a sensitive valve and master control cylinder. The valve is actuated by a tracer point which "feels" the outlines of a pattern, or template, and meters oil directly to the control cylinder. The piston in this cylinder moves a tool slide which supports the cutting tool. When attached to the Bullard turret lathe, the device accomplishes exact duplicates of master patterns directly in metal.



Timely Subjects Discussed at SAE Tractor-

FOR the fifth consecutive series of production clinics sponsored by the SAE National Production Activity, the scene shifted to Milwaukee where a Production Forum was held September 10-13 in conjunction with the SAE National Tractor Meeting. The forum in Milwaukee was developed under the chairmanship of M. L. Frey of Allis Chalmers. Attendance was most gratifying with over 300 registered and specific interest at each of the panels was keen.

Seven panels were featured at this meeting with

the following leaders: Gears—B. W. Keese, Wisconsin Axle Div., TDA; Materials Handling—William Naumann, Caterpillar Tractor Co.; Quality Control—H. A. Weissbrodt, International Harvester Co.; Welding—with J. J. Chyle, A. O. Smith Corp.; Heat Treating—J. T. Schoen, Marquette University; Forging—J. J. Dierbeck, International Harvester Co.; Foundry—F. J. Walls, International Nickel Co.

Reflecting the nature of the times, the subject of boron steels was a major topic at the sessions on gears, forgings, welding, and heat treatment. The consensus

was that boron steels are still in an experimental stage and much more work must be done throughout the automotive industries before their applications can be considered as routine.

The forging panel gave considerable attention to the growing use of induction heating, Lithium atmosphere furnaces, and relative cost economy of press forging vs hammers, as well as the growing adoption of upsetters. The economy of press forgings vs hammer practice produced some heated exchanges in view of the apparently higher initial cost of press forging installations. Despite that, some of the companies using press forging supported their practice with figures providing lower overall cost per piece. Shot peening, using cut wire

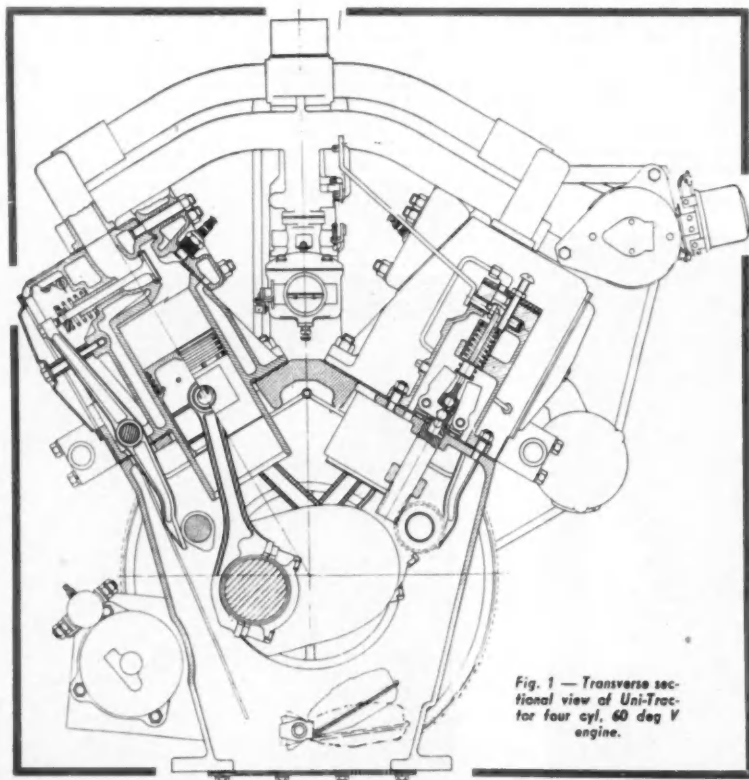


Fig. 1 — Transverse sectional view of Uni-Tractor four cyl. 60 deg V engine.

Production Meeting

and steel shot, also proved to be widespread practice not only for cleaning but for preparing the surface of highly stressed parts as well.

Nodular iron, one of the relatively new techniques in the foundry came in for attention at the foundry panel, the reaction being that the technique is still in its infancy as a general practice. Good housekeeping and soot and dirt control evidently have been given more attention and it was the consensus that much remains to be done before the foundry operation—throughout the industry—can compare with the housekeeping in machine shops. It was agreed that mechanization is one of the basic elements of foundry economy and should be increased as time goes on. Education of workers and supervision was one of the major topics for discussion.

Quality control discussion centered about management problems in the installation of the system in a given plant. It was emphasized that the new technique requires an educational program designed to sell the machine operator, the inspection staff, and supervision.

The gear panel was concerned with many detail problems troubling different plants. Design problems such as the relative merits of keying and splining, selection of pitch size for involute splines, whether to standardize on the major or minor diameter or sides of splines, were among the questions tossed about among the experts. The role of boron steels came in for extended debate as it did in other panels. Shot peening as a means of overcoming scoring and fatigue failure in hypoid and spiral bevel gearing also was discussed.

Materials handling covered the gamut of problems of small and large plants, dealt with the relative economy of floor handling compared with conveyor systems, the use of industrial trucks, cranes, and other devices. It was obvious that the nature of the materials handling systems to be employed in a specific plant depends to a large extent upon the size and scope of the operation. Returnable vs disposable pallets or tote boxes also was debated, the conclusion being that palletizing at the source or at least at the point of receiving was the most economical procedure.

With a total registration close to 1000, the tractor meeting was one of the most successful held in recent years. Among the most important subjects covered were the paper on wide base rims, indicating definitely that widths in excess of the standard 12-inch size are not desirable, special modifications of tractors and

earth moving machinery to suit military requirements, announcement of the three-wheel tractor unit by M-M for powering self-propelled farm machinery, the study of bevel gear design, and others.

With regard to the M-M Uni-Tractor, it is of interest that other manufacturers in the tractor field are working on similar developments in the interest of simplifying the design of implements, reducing maintenance, and reducing first cost of farm machinery.

The Ethyl Corp. paper dealing with valve life recommends use of valve rotators for tractor engines as a means of extending exhaust valve life. It is of interest that the new Ferguson tractor engine is fitted with exhaust valve rotators. The analysis of tractor bevel gear design indicates wide divergence in practice, points up the need for a rational approach based upon an approved empirical formula. Need for establishing a standard test to measure the productive capacity of motor power-graders was voiced by Stoelting, of the J. D. Adams Mfg. Co.

Rehabilitation of friendly European nations has created an enormous demand for farm tractors and machinery and should constitute a ready market for American equipment, particularly with the backing of ECA money. Whether or not current events make it possible to release much American equipment for this purpose, the demand does constitute a strong market potential for the future.

The meeting closed with the annual dinner, principal speaker being J. S. Duncan, president and chairman, Massey-Harris Co., Ltd., his topic being the "Free World at the Crossroads."

Herewith are abstracts from some of the outstanding papers:

Development in a Universal Propelling Unit

By Martin Ronning

Chief Engineer, Minneapolis-Moline Co.

IN an effort to make available self-propelled farm machines of various types, development was authorized of a more or less universal self-propelled basic carrier on which various machine bodies could be interchangeably mounted. Design work was started early in 1945 on the basic carrier and also the harvester and corn picker units to be used with it. An experimental unit was tested in 1946 and a number

(Turn to page 92, please)

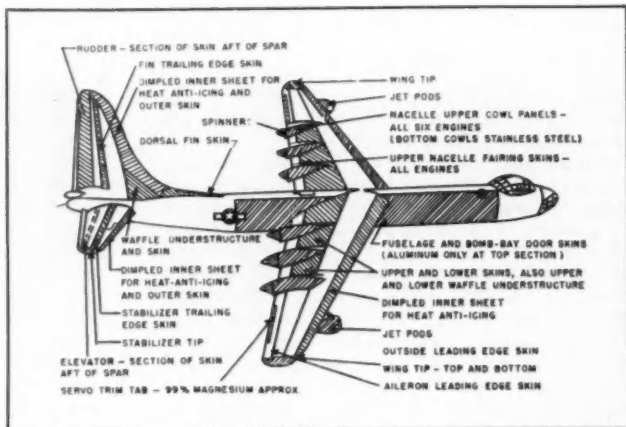
Five Tons of Magnesium in B-36 Airframe

AN important factor in making possible the speed, range, and load-carrying capacity of the B-36 bomber is the liberal use of magnesium. In building the world's largest bomber, Consolidated Vultee Aircraft Corp. is using approximately five tons of the light metal for the airframe alone.

In addition to the airframe tonnage, the Convair B-36 uses Government supplied components—such as wheels, gun turrets, electronic equipment, engines, and brakes—which contain a total of several tons in magnesium parts.

Of the magnesium airframe tonnage, only 25 per cent is used for castings, forgings, or extrusions. The remaining 75 per cent is in the form of sheet metal components. Magnesium alloy sheet was used to make possible the use of large stiffener spacings and to avoid the formation of shear wrinkles under normal unaccelerated flight conditions.

Plating for approximately one-half of the fuselage



B-36 magnesium units depicted here include airframe components and equipment supplied by the Government.

plus wing and control surface leading edges—including both the inner and outer skins used for the anti-icing system—are just a few of the many important assemblies where magnesium is predominant. The illustration on this page shows these as well as other major airframe units which compose the bulk of the magnesium poundage.

• • •

Ohio Companies Lead In Necessity Certificates

More certificates of necessity for accelerated tax amortization of new or expanded defense production facilities have been issued to Ohio industries as of Aug. 18 than to any other state, the Defense Production Administration disclosed recently. As of Sept. 13, certificates had been issued to 3453 applicants on projects having a total value of \$9,427,055,357. A geographic analysis of applications approved for rapid tax write-off shows that, of 3328 issued through Aug. 18, 328 went to Ohio companies on projects aggrega-

ting \$672,326,000. Pennsylvania firms were awarded 307 certificates on projects totaling \$1,125,615,000, while 287 went to California industries on projects totaling \$313,847,000. Cleveland received 94 certificates or approximately 29 per cent of the number issued for defense expansion in Ohio. Akron and Cincinnati received 29 each and Youngstown and Canton 24 each. The rest was distributed in various localities throughout Ohio. In Pennsylvania, Pittsburgh led the list with 101 certificates. Philadelphia was granted 79. In California,

Los Angeles received 165 certificates, San Francisco was awarded a total of 45 altogether.

On a sectional basis, the East North Central states led the country in the number and dollar value of proposed investment expansion certificates. Second highest on the sectional list were the Middle Atlantic states, and in third place were the West South Central states. The East North Central group (Ohio, Indiana, Illinois, Michigan and Wisconsin) received 881 certificates for projects aggregating \$1,887,755,000. The Middle Atlantic group (New York, New Jersey and Pennsylvania) was awarded 643 certificates on projects totaling \$1,600,979,000, while the West South Central States (Arkansas, Louisiana, Oklahoma and Texas) received 205 certificates on projects amounting to \$1,152,032,000.

New Machines for Making Tank Torqmatic Transmissions

By Joseph Geschelin

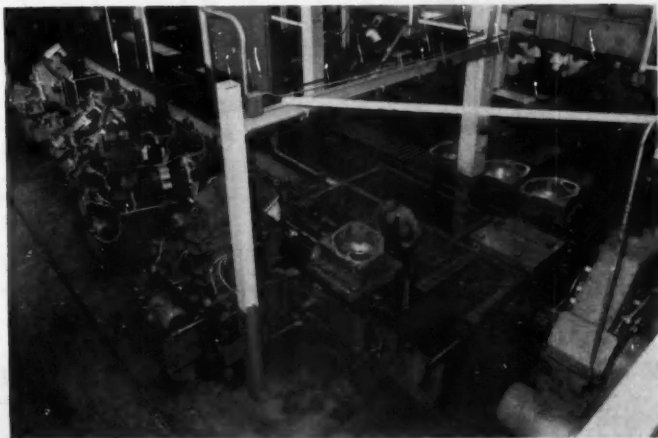
IN its current expansion program, Allison Div., General Motors Corp., Indianapolis, Ind., recently placed in operation what is known as Plant 7 for the manufacture of parts and torque converters for Torqmatic transmissions designed for Army tanks of latest type. Plant 7 produces the transmission case assembly, consisting of RH and LH aluminum housings, torque converters, and a variety of other parts. Then these units are transported to the Allison main plant for final assembly.

One of the noteworthy items of equipment in this plant is an eight-station transfer machine built by Buhr, the first machine of its kind made by this manufacturer. Principal duty of this machine is to produce a variety of drilled holes in the case mostly in odd angular locations. The numerous other drilling and tapping operations are performed in way-type Natco units. The Buhr transfer machine is completely automatic in operation, and features an automatic transfer conveyor. Built to latest JIC standards, it is designed to simplify maintenance by presenting all wiring, plumbing, and hydraulic elements within easy reach. In addition, the hydraulic system for each of the stations is composed of standardized interchangeable elements which can be readily removed and replaced out of
(Turn to page 90, please)

Overhead perspective of the unique Buhr transfer machine for drilling a group of angular holes in the enormous transmission case. Start of the operation is at the extreme right, the last station being in the foreground. Big, massive shuffle fixtures are employed, the transfer being made from the end of the line to the gravity conveyor in the background which returns the fixtures to the first station.



Closeup of one of many Pratt & Whitney profilers of new design tooled for profiling and end-milling of pad outlines and pad faces in recesses on the sections of the transmission case. This closeup of the work station shows clearly the method of guiding the spindle by means of a machined template. Another template, of drop-leaf form, required for a profiling operation may be seen in the background.

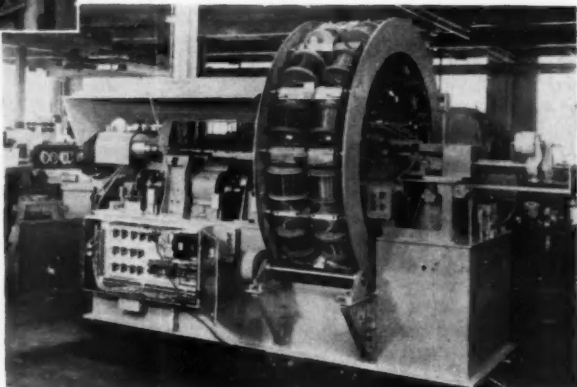




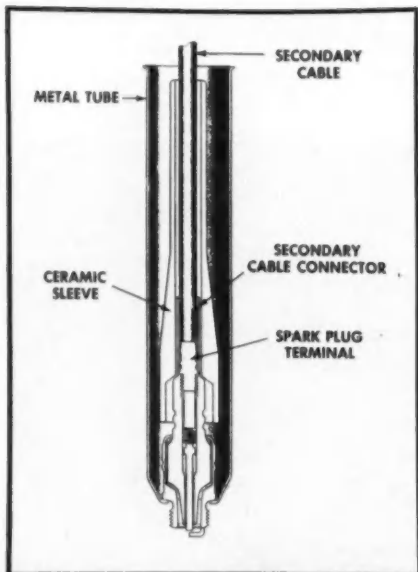
New Automatic Machine Winds Generator Armatures

(Left)—Closeup of work station in the new armature winding machine. Loading of armature cores for coil winding is automatic, and all 28 coils are wound simultaneously.

(Right)—This Ceeco automatic armature winding machine has just been completed by Lewis Welding and Engineering Corp., Bedford, Ohio, and, together with three additional machines now under construction, has been purchased by the Ford Motor Co. Its 84-in. reel rack holds 28 spools of wire, each of which weighs 80 lb. A system of solenoid valves, electrically timed, controls operation of the machine which weighs more than seven tons.



...



No Spark Plug Gaskets in Chrysler Firepower Engine

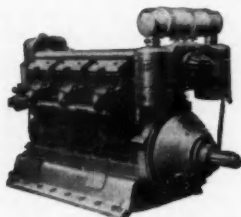
THE spark plug installation in Chrysler's V-8 Firepower engine is an unusual one. There is no gasket in this installation. The lower end of the metal cylinder which fits between the spark plug and cylinder head acts as a gasket. Protection against flashover of ignition current to the metal cylinder is provided by a specially-designed ceramic sleeve. Spark plugs in this engine are the resistor type and the electrodes are spaced at 0.035 in.

Cutaway view shows (1)—secondary cable, (2)—metal tube, (3)—ceramic sleeve, (4)—secondary cable connector, (5)—spark plug terminal, (6)—spark plug.

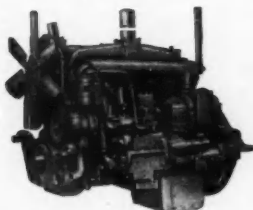
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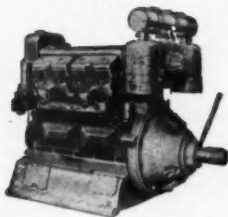
Model 447-C—Harnischfeger Corporation 6 cylinder, 2 cycle using two S-C superchargers.



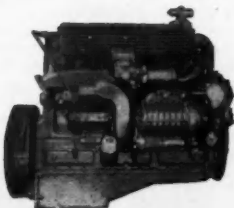
Model D-397—Caterpillar Industrial Diesel V-12.



Model D-337—6 cylinder—Caterpillar Diesel.



Model D-375—Caterpillar Diesel V8.



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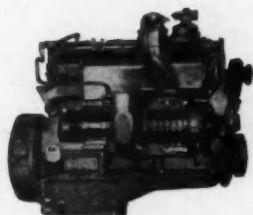
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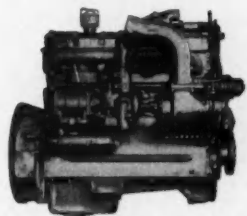
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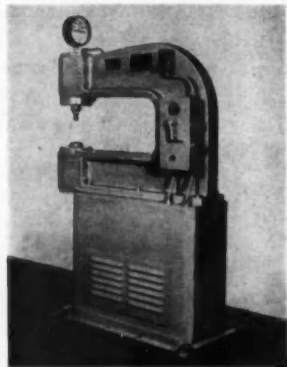
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FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 62

E-57—Brinell Hardness Testing Machine

A Brinell hardness testing machine which incorporates a throat depth of 24 in. is being produced by Steel City Testing Machines, Inc., Detroit, Mich. Designated model AP-1, this C-frame machine incorporates several features. Mounted on wheels so that it can be



Steel City Brinell hardness tester, model AP-1.

rolled into position reaching out over a conveyor, the lower anvil is the top of a hydraulic piston which rises as the

load is applied to take the pressure off the conveyor. Machines are made to order so that anvil height will conform to various conveyor heights. The maximum vertical opening between ball penetrator and anvil is four in.

The machine applies a 3000 kilogram load, and the diameter of the impression is measured with a Brinell microscope as in all Brinell hardness testing. The hydraulic unit is located in the base which supports the C frame. Overall dimensions are approximately 41 in. deep by 19 in. wide. Height depends on anvil height specified. Weight is approximately 900 lb.

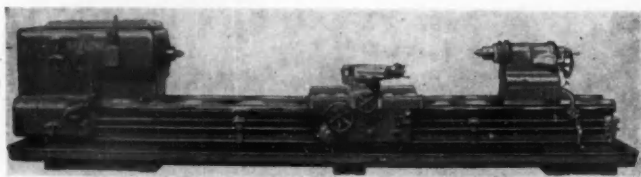
E-58—Heavy Duty Engine Lathe

Four-directional power rapid traverse, standard equipment on the new 32 in. heavy duty engine lathe built by the R. K. LeBlond Machine Tool Co.,

Cincinnati, Ohio, makes possible fast and convenient traversing of carriage and cross-slide, each in two directions. The lathe may be equipped for hydraulic (Hydra-Trace) or mechanical profiling. Other provisions include 34½ in. swing, 32 spindle speeds from 4 to 500 rpm, totally-enclosed quick-change box, hardened and ground replaceable steel bed ways, and automatic lubrication throughout headstock, quick-change box and apron.

The headstock incorporates the free-running principle with hardened and ground steel gears; only the gears actually needed are in mesh at a given speed, the remainder running free. No-load friction hp is thus minimized leaving maximum power available for removing metal. The machine is arranged for 25, 30 or 40 hp motor, 1200 rpm. Forty-eight feeds and threads may be selected; feeds from 0.004 in. to 0.250 in.; threads from ¼ to 46.

(Turn to page 58, please)



LeBlond 32 in. heavy duty engine lathe having four directional power rapid traverse.

News of the Machinery Industries

Production Stressed

In a recent meeting of the NPA machine tool industry advisory committee, members were told by the NPA authorities that the machine tool production program is the foundation of the defense effort, and that output "must" be increased. The NPA wants the builders to place more emphasis on sub-contracting.

According to industry spokesmen, sub-contracting has been a very difficult problem. Sub-contractors are unable to produce parts or components of machine tools at the cost level of a regular producer. Another factor is that sub-contractors, in general, are seldom willing to produce whole units.

To help expand production, unused facilities for forging, foundry work and machine tool building in Navy yards are being made available to machine tool builders, according to information from the Navy Department.

Priority Assistance

NPA authorities claim that a new type of special priority assistance may be given to machine manufacturers to eliminate key bottlenecks. This assistance would be limited to specific companies which require help in procuring component items that are in critically short supply and whose scarcity is retarding the output of machinery.


Shortages have been reported by

various firms in certain types of large bearings, and in special-type electric motors, switches, relays and pumps. Lack of some of these items has been delaying shipments of nearly completed metalworking units.

This new assistance setup would not be as broad as the machine tool builders have asked for, but it is a step on the way which may help the industry to obtain critical components. Controlled materials—steel, copper, and aluminum—will not be available under the present plan being considered. The NPA will continue to handle spot shortages in certain steel and copper products on an individual directive basis.

(Turn to page 76, please)

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For additional information regarding any of these items, please use coupon on page 62

(Continued from page 56)

E-59—Mechanical Press

Designed to meet requirements for accuracy of alignment needed to produce intricate stampings, the Minster Machine Co., Minster, Ohio, has brought out its Piece-Maker automatic production press. The unit has a fly-wheel type combination air-operated friction clutch and brake with pendant, pedestal or press mounted clutch controls.

Four long gibs with eight guiding surfaces control the slide in two directions. Adjustable bronze ways are used



Minster automatic production press, the Piece-Maker.

on each corner of the slide. Slide adjustment is of the long sleeve type, manually-operated.

The Piece-Maker has a double throw full eccentric shaft, is offered in the flywheel type and in a capacity range from 20 to 150 tons. All P2 series presses are offered with variable speed drives, having speed ranges to fit the size and use of the press.

E-60—Swiss Automatic Screw Machine

Announcement has been made by Carl Hirschmann Co., Manhasset, N. Y., of the availability of the Tornos type R10 high-speed sliding head Swiss auto-



Tornos automatic screw machine, type R10.

matic screw machine for pinion blanks, shafts and small slender parts.

Spindle speeds for the 7/16-in. normal stock capacity machine range from 1050 to 10,000 rpm. For speed selection 20 changes are available with 40 camshaft speed changes for each spindle speed.

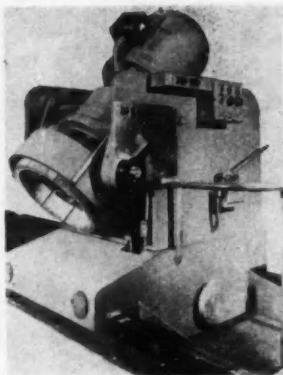
In operation, the headstock moves longitudinally in order to impart axial feed to the bar while the bar revolves with the spindle. Axial movement of the headstock is derived from an adjustable cam-operated mechanism called Radiax. The long headstock slide is said to be free from any reaction from the spindle drive. Thrust of the chucking mechanism is absorbed by the machine bed. An adjustable needle bearing at the front and ball and thrust bearings at the rear carry the belt-driven, tension-free spindle.

Five tool bits turn the work by a combined radial in-feed of the tools and an axial feed of the rotating bar past the tools. All tools are set by micrometer screws. Vertical tools clamp with a single screw and rocking clamp.

E-61—Traveling Head Grinder

Offered by Mercury Engineering Corp., Milwaukee, Wis., is a traveling head grinder, series E-20, for face grinding.

This grinder runs on precision rollers along machined rails which are equipped with built-in leveling devices. The series E-20, employing a 20-in.

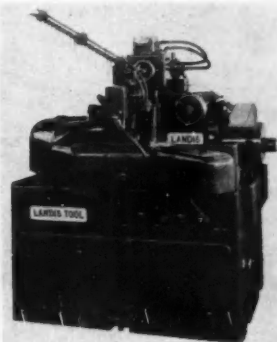


Mercury traveling head grinder, series E-20

face-type grinding wheel mounted on a head which tilts from horizontal to full vertical, has a continuously variable traverse rate. Two or more grinders can operate simultaneously on a single set of rails.

It utilizes a 20-hp motor and heavy duty spindle assembly which are arranged to feed in and out through 7-in. range.

E-62—Automatic Grinder



An automatic grinding machine, designed for grinding the faces of internal combustion engine valve faces, is being manufactured by Landis Tool Co., Waynesboro, Pa. An automatic loader is used to carry valves and insert them, one at a time, in the headstock. Hydraulic clamping is used in the headstock to position and hold the valve during the automatic face grinding operation. After grinding, the valves are automatically ejected to a chute. An automatic wheel dressing mechanism is used to dress the wheel after a pre-determined number of valves have been ground. A compensating feed advances the wheel to take care of the reduction in wheel size. During the dressing cycle, the reciprocating wheel mechanism disengages automatically. The grinding wheel is 24 in. diam and is driven by a 7½ hp motor. Microsphere bearings are used for both the headstock and wheel spindle.

(Turn to page 60, please)

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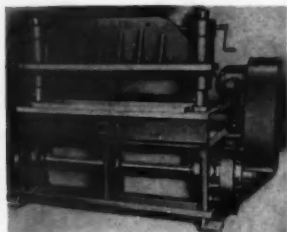
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(Continued from page 58)

E-63—Punch Presses

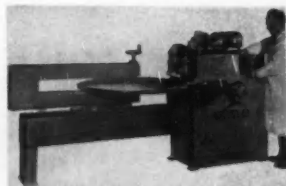


Four models of twin column punch presses have been brought out by the Wale-Stripit Corp., North Tonawanda, N. Y., for all types of blanking, forming, drawing, and bending. Ram guides are four in. diam. and are positioned vertically at 90 deg. The actuating mechanism of the ram operates inside the vertical ram posts. Heavy-duty liners in the sleeves are fully enclosed by a two-way seal.

E-64—Circle Shear and Flanger

Niagara Machine & Tool Works, Buffalo, N. Y., has on the market a high-speed circle shear and flanger, designed for the production of disks and heads.

It is capable of shearing and flanging a wide range of diameters and thicknesses of material. As a circle shear it cuts circular disks or circular



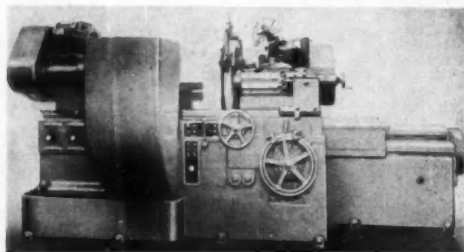
Niagara circle shear and flanger.

arcs of sheet metal up to eight gage mild steel or 12 gage stainless steel. Disks eight-in. diam to 58-in. diam are produced from square blanks. Disks as large as 75½-in. diam can be cut from octagonal blanks.

As a flanger it turns flanges up to 1½-in. deep from circular disks. The upper roll is moved down by power with speed adjustable to suit diameter

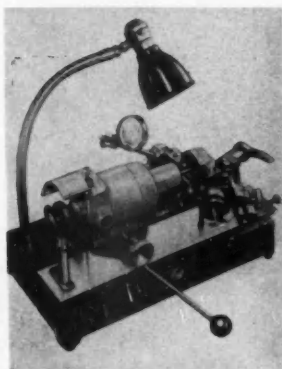
and thickness of blank. Standard flanging rolls form a radius at the root of the flange of ¼ in. Head diameters ranging from 18½ in. to 73½ in. can be flanged.

Norton aircraft strut grinder.



E-65—Drill Grinder

A drill grinder for two-lip twist drills, from No. 70 to ¼ in., either straight or tapered shank, is available from the Dumore Co., Racine, Wis. Any included angle of drill point from



Dumore drill grinder.

90 deg to 160 deg and any clearance angle from 5 deg to 15 deg can be ground.

The quick-locking chuck features an infeed for finish cuts on fine reshaping work, for very small drill sharpening, and for extra speed when extreme changes in point or clearance angle are required. A combined drill rest and diamond holder is provided for pregrinding broken drills and dressing rough grinding.

Powered by 1/5 hp, 115V Dumore motor, the drill grinder swings a two in. by ¾ in. by ¼ in. wheel for sharp-

E-66—Aircraft Strut Grinder

An aircraft strut grinder, built by Norton Co., Worcester, Mass., is for grinding the components of landing gear mechanisms used on large planes.

It is arranged for a 26-in. or 32-in. diam swing over the table, and is available in work length capacities of 72 in. and 96 in. The strut grinder offers a swing capacity of 80 in. or 86 in. by means of a gap, which is adjustable in width. Gap may be set to any desired width up to 26½ in.

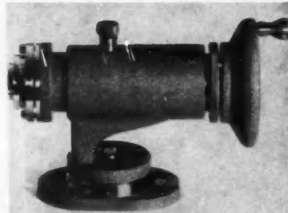
It is of the traveling wheel head type.

ening. An identical wheel is mounted on other end of motor armature shaft for rough grinding broken drills to shape, together with a thinner wheel for web thinning. Standard equipment includes one ¼ in. collet; chuck extension drill holder for No. 52-70 drills; diamond wheel dresser; and set-up gauge.

E-67—Relief Grinder

A relief grinder, IGC, developed to handle countersinks, center drills, integral pilot cutters, etc., has been put in production by Western Aero Industries, Burbank, Calif.

The IGC fixture fits standard



Western relief grinder, IGC.

grinders, and is said to handle work from 1/16-in. to one-in. diameter with standard collets. The lift of the single cam is variable from 0.001-in. to ¼-in., and adjustment pins are provided for one, two, three, four, and six fluted cutter grinding. Fixture swing is 90 deg to the right or left and the base is calibrated in 5-degree increments.

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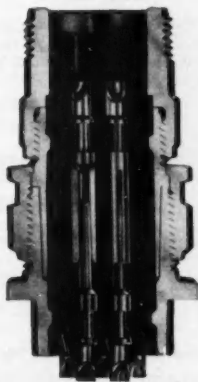
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D-96 Grinder

The Cincinnati Milling Machine Co.—Catalog, No. M-1734, illustrates and describes the No. 2 cutter and tool grinder, and all standard and extra attachments for these machines.

D-97 Presses

E. W. Bliss Co.—Just published is a 28-page manual for Bliss S-2 presses.

D-98 Welding Electrodes

International Nickel Co., Inc.—Offered is a 19-page booklet on nickel-molybdenum - vanadium alloy steel shielded arc welding electrodes.

D-99 Degreasers

Phillips Mfg. Co.—An illustrated bulletin describing the company's line of degreasing equipment has just been published.

D-100 Aviation

Eaton Mfg. Co.—Available is, "A Chronicle of the Aviation Industry in America—1950 Supplement," the fourth in a series of booklets.

D-101 Powder Metallurgy

Bound Brook Oil-Less Bearing Co.—Applications of powder metallurgy in bearings and structural parts are the keynote of "Bound Brook Bulletin," the first issue of which was recently published.

D-102 Painting

Ransburg Electro-Coating Corp.—A booklet explaining the electrostatic process in spray painting is offered.

D-103 Machine Tools

Russell T. Gilman Co.—Announced is the publication of "Machine Tool News Flashes."

D-104 Aircraft Products

Aeroproducts Div., GMC—A recently issued information letter, "f.y.i.," covers the company's aircraft activities.

D-105 Driveshafts

Morse Chain Co.—A bulletin, F 41-51, on Morse Morflex radial and universal driveshafts is available.

106-D Tubing

Carpenter Steel Co.—A 12 in. by 9 in. card gives useful corrosion resistance information for several analyses of stainless steel tubing and pipe.

D-107 Fork Trucks

Baker Industrial Truck Div.—Specification bulletin number 1328 contains complete engineering and operating information on Baker's type JOM fork trucks.

D-108 Speed Reducers

Abart Gear & Machine Co.—A pocket-size catalog of speed reducers and right angle gear motors is ready for distribution.

D-109 Industrial Trucks

The Elwell-Parker Electric Co.—Just released is a condensed general catalog covering high lift and low lift platform trucks, fork trucks and mobile cranes.

(Turn to page 114, please)

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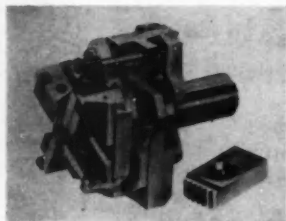
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F-77—Die Heads

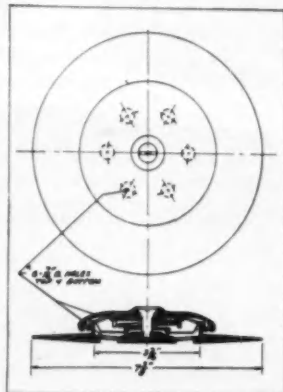


Jones & Lamson Machine Co., Springfield, Vt., has added a die head line, covering the complete B&S range from #0 to 1 1/4 maximum. The J&L die sizes are arranged so that a single given size die will cover the capacity of a given B&S machine size. These dies are for Brown & Sharpe automatics and small turret lathes. J&L guarantees class three threads.

Both radial and tangent chasers of these dies are mounted on the face of die. Dualite insert chasers for #00 machine dies are used. Two-thirds of the line, using tangent chasers, provides permanent throat feature. All have cushion springs, are precision lapped and fit chaser holding blocks.

F-78—Low-Pressure Relief Valve

Andrews-Alderfer Processing Co., Inc., Akron, Ohio, has announced the



Andrews-Alderfer low pressure relief valve, the A-120.

availability of the type A-120 relief valve that features positive control on two psi air pressure and large volume exhaust at three psi. The unit is said to withstand government salt spray tests as well as aging and dirt accumulation tests. It permits only a one-way flow.

This valve is 1 1/4 in. high and 7/8 in. in overall diameter. The working parts are mounted in a flexible rubber base and are protected by a steel cap and rubber shield. Components are fabricated from stainless steel and natural or solvent-resistant neoprene rubber stocks.

F-79—Metallizing Guns

Two metallizing guns have recently been announced by Metallizing Engi-



Metco metallizing gun.

neering Co., Inc., of Long Island City, N. Y. The guns, the Metco type 4E for machine element work, and the type 5E for corrosion protection coatings, are said to develop the highest spraying speeds yet available in guns designed for hand-held operation. These guns incorporate a jet siphon principle in the gas head which automatically compensates for variation in gas pressure as high as 10 lb.

They also incorporate automatic control of wire feed which compensates for kinks in the wire, reel stand drag, etc. Metco type 4E Gun is designed to spray all wires from 20 B&S gauge to 1/8 in. in any metal-carbon steels,

stainless, Monels, bronze—at speeds up to 40 per cent faster than previous models. Type 5E is specifically designed for high speed spraying of the softer metals, such as zinc and aluminum, for protection of equipment and structures against corrosion.

F-80—Air Sander

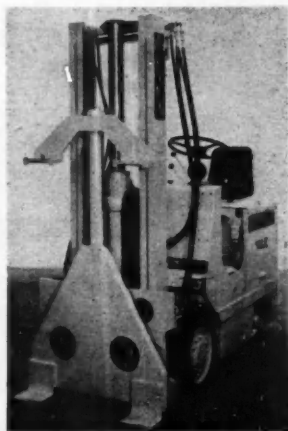
A straight-line action air sander for finishing welded seams has been placed on the market by Sundstrand Machine Tool Co., Rockford, Ill.

Included in the Sundstrand line are single-pad models for small areas, and double-pad models for work on large areas. Weights range from 5 1/2 to 30 lb, with speeds varying from 1100 oscillations per minute on the heavy duty sander to over 3000 per minute on the small single-pad model.

F-81—Fork Truck Clamp Attachment

An automatic clamp attachment for industrial lift trucks to tier crated and boxed products is now available from the Philadelphia Div., Yale & Towne Mfg. Co., Phila., Pa. Hydraulically op-

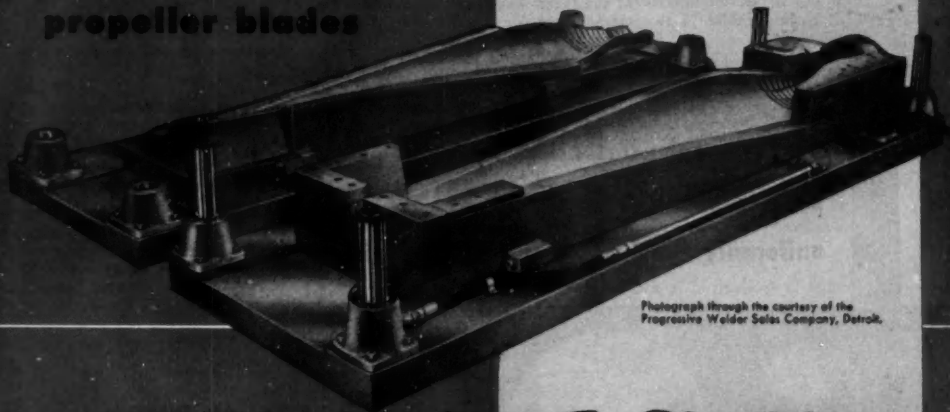
(Turn to page 66, please)



Yale & Towne fork lift truck with the automatic clamp attachment.

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aircraft
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Photograph through the courtesy of the
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- *LOS ANGELES 24, Cameron Metals & Supply Co.,
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(Continued from page 64)

erated, the clamp handles two objects up to 75 in. high and 36 in. wide each and is capable of stacking them 17 ft.

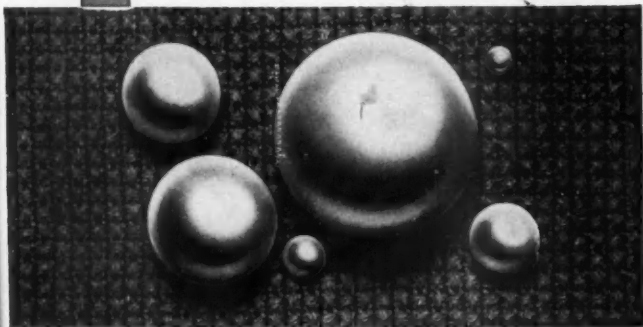
It is available on practically any capacity Yale gasoline powered or electric industrial truck. The short length of the forks makes the truck and crate clamp ideal for loading freight cars.

IN

size and spherical accuracy

perfection of surface

uniformity—dependable physical quality



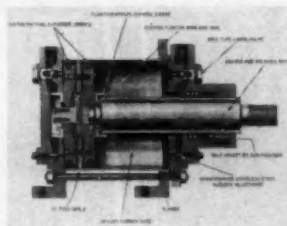
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F-82—Low Pressure Cylinder



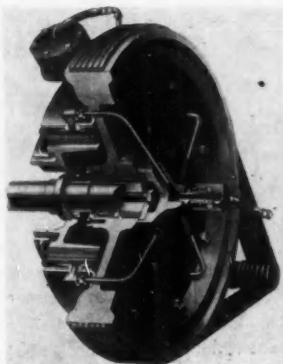
Hanna air, oil or water operated cylinders, Model LP.

Improved design and construction are features of the latest low-pressure cylinders produced by Hanna Engineering Works, Chicago, Ill. These model LP cylinders can be operated by air, oil or water up to 110 psi.

Among the features of LP cylinders are: a cork floater ring; spring-backed chevron rod packings which are self-adjusting; and the flange design which permits removal of the front head without disturbing the mounting. Standard models permit the selection of a cylinder to meet most mounting requirements.

F-83—Air Friction Clutch

A Press-Rite Airflex air friction clutch, spring and air-applied brake combination for use with the line of Press-Rite power presses, has been an-



Sales Service air friction clutch.

ounced by the Sales Service Machine Tool Co., St. Paul, Minn.

Clutch and brake are both of the constricting drum type. The brake is applied by a constant pressure spring opened and released by air and its actuation opens a valve to release air from the clutch. Interlocking of clutch and brake action prevents either from

(Turn to page 68, please)

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"THERMOIL-GRANODINE"® a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

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The oiled "THERMOIL-GRANODINE" coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

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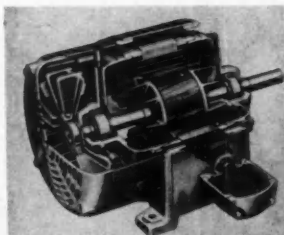
(Continued from page 66)

being engaged while the other is operating. If air or electric power fails, the clutch disengages and the spring brake stops the press instantly. Clutch and brake shoe linings are self-compensating for wear.

The clutch is designed for optimum efficiency at pressures from 40 lb to 80 lb and will operate satisfactorily at as low as 25 lb. The 360 deg contact of friction surfaces provides full operating power for a given clutch gripping pressure.

F-84—Explosion-Proof Motors

A 10-feature totally-enclosed motor for explosion-proof requirements has been developed by U. S. Electrical Motors, Los Angeles, Calif. Made in capacities from three to 75 hp, this new motor, types SE and SES, carries the Underwriters' label in Class I, Group D, for highly inflammable gases and volatile liquids, and in Class II, Groups F and G, for combustible dusts. Other types SD and SS without label,

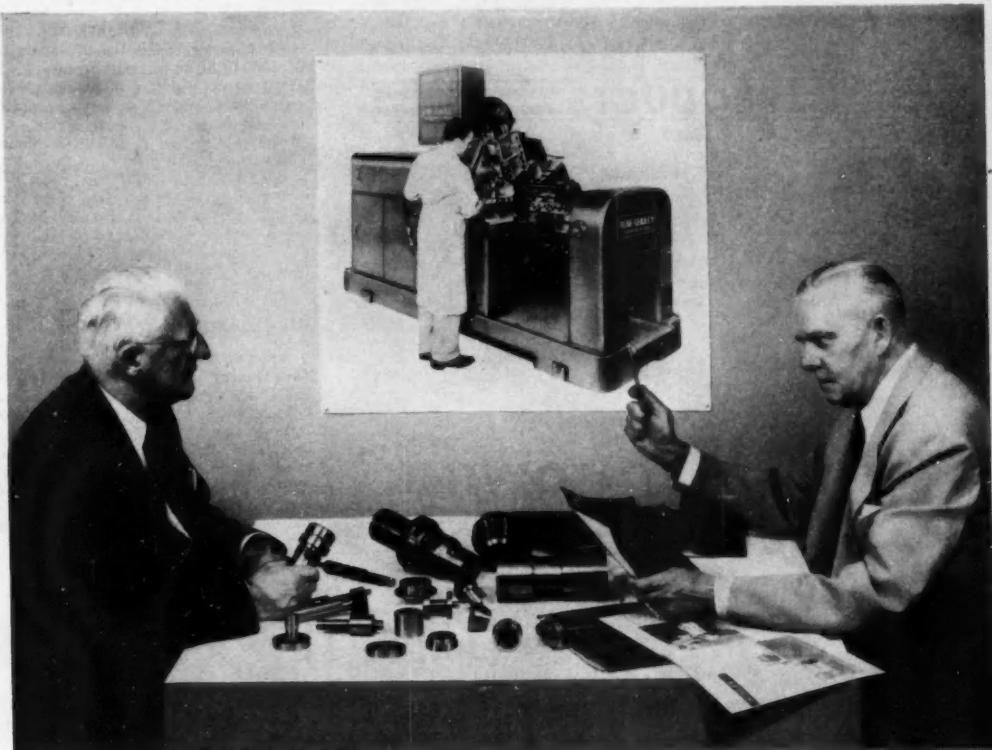


U. S. explosion proof motor.

for non-explosion-proof services, are also available. Features incorporated include: Sealed terminal, elongated spark-arresting bearing sleeves, streamlined housing, hi-draft ventilation, removable cover, split hub fan, normalized castings, Lubri-flush bearings, asbestos-protected windings, and solid, centricast rotor. Being completely sealed, this motor gives protection against external hazards, preventing intrusion of abrasives, acids, moisture and other deleterious substances.

F-85—Fork Trucks

Towmotor Corp., Cleveland, Ohio, recently announced the addition of five
(Turn to page 70, please)



PIN-UP FOR PRODUCTION WITHOUT EXPERIMENTATION

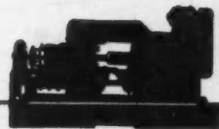
With an Acme-Gridley Model M Bar Automatic you're ready to go on munitions parts like these. No educational orders, trial runs or experimental tooling necessary!

National Acme engineers have taken all those preliminary steps for you, months ago. The standardized tooling and production methods they set up are proved in use on many batteries of Acme-Gridley automatics, turning out countless millions of parts, 'round the clock, for quick rearmament.

So don't waste time in expensive experimentation . . . avail yourself of this ready-made experience that comes as a plus value to every Acme-Gridley owner. Our engineers will be glad to get you started on the road to greater munitions production, *greater profit*. They'll also be able to give you the latest information on how to take advantage of our constantly improving methods to get top performance from your present Acme-Gridleys. May we help you?

THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 1, 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

(Continued from page 68)

models to the Towmotor line. Three of the models, replacing three former models, have solid or cushion tires and

a shorter wheelbase for greater maneuverability. The two other models feature pneumatic tires on all wheels to bring to three the number of models so equipped.

THE *Balanced* SOLVENT... FOR ALL JOBS **BLACOSOLV** FOR ALL METALS OR COMBINATION OF METALS

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ONE SOLVENT
IS ALL YOU NEED



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SOLVENT VAPOR
DEGREASERS**
are more economical
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Metal Parts Washers
for use with cleaning
compounds on either
batch or production jobs.

HIGHEST STABILIZED DEGREASING SOLVENT—NOT ALKALIZED!

BLACOSOLV contains the finest and toughest stabilizers to prevent solvent breakdown. You need not pay premium prices for special solvents for different metals. Blacosolv can be used over and over, under the most rigorous conditions, without impairing its high qualities.

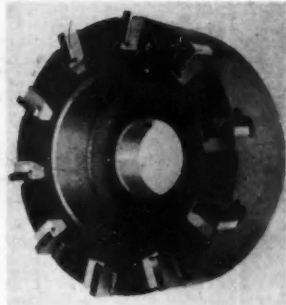
G. S. BLAKESLEE & CO.

1844 S. 52nd Avenue • Chicago 50, Illinois
New York, N. Y. Toronto, Ont.

The five units are: 1—Model 480-P with 48-in. wheelbase, and a capacity of 4000-lb at 24-in. load center. Pneumatic tires are used. 2—Model 390 has a 39-in. wheelbase, and a capacity of 3000 lb at 15-in. load center. 3—Model 400-P has a 40-in. wheelbase, and a capacity of 2000 lb at 24-in. load center. Like the 480-P, the 400-P is equipped with pneumatic tires. 4—Model 420 has a 42-in. wheelbase, and a capacity of 4000-lb at 15-in. load center. 5—Model 460 has a 46-in. wheelbase, and 4000-lb capacity at 24 in. load center.

F-86—Milling Cutter

Another solid carbide indexable blade face milling cutter has been added to the Detroit Milling Cutter Co., Farmington, Mich., line of Futurmil face milling cutters. Designed for milling cast armor plate and other difficult steel machining jobs, the solid carbide blades, when dull, can be indexed to a new cutting edge since the clearance angles are taken care of by the position



Detroit indexable blade face milling cutter.

of the blade in the cutter body.

The blade is square and is furnished in three optional sizes ranging from 1 in. to 3/4 in. depending on the depth of cut desired. Blades can be indexed or substituted without removing the cutter from the milling machine spindle. A blade can be indexed eight times before regrinding.

F-87—Air Operated Screw Drivers

Ingersoll-Rand Co., New York, N. Y., has brought out a line of cushion clutch air screw drivers in three basic sizes for general manufacturing operations. The cushion clutch consists of two units—an engaging clutch and a torque limiting clutch.

The engaging clutch enables the screw driver to be moved from screw to screw without stopping the motor. Forward pressure on the tool is necessary to start bit rotation. Other features include conveniently located throttle and reserve valves, bit holders which permit quick changing of bits

(Turn to page 72, please)

"EAGER BEAVER" Army's newest six-by-six. Built by Reo Motors Inc., Lansing, Michigan. Lives up to its name by hauling a full pay load up 60° grades . . . traversing rivers and streams with its engine fully submerged. The South Wind "978" introduces fresh air to keep windshields completely frost-free, cab and personnel comfortably warm.



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Now ready to roll. Specially equipped to keep rolling under the severest weather conditions! These new Army vehicles boast increased personnel comfort, greater efficiency in sub-zero cold—all the results of an amazing new military heater: the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been standardized by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

ACT NOW: Find out how this revolutionary new "978" military heater can effectively answer your vehicle heating and engine pre-heating requirements. Get the experienced counsel of a trained field engineer. Wire, write or phone Stewart-Warner Corporation, South Wind Division, 1514 Drover Street, Indianapolis 7, Indiana. Do it today.

STEWART-WARNER


PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING



12 WHEELED eight ton heavy duty cargo carrier. South Wind "winterized." A "978" heater keeps frost off the windshield . . . freezing cold outside the cab.

SELF-PROPELLED artillery. New M 41 Motor Carriage with 155 mm. Howitzer. Equipped with two South Wind "978's" for personnel heating, and for heating gun components.





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THESE Fairchild Aircraft Packets carry men and materiel spelling nothing but trouble for the enemy.

But the packet of lightweight castings used on the Packet and made by Wellman won't cause any trouble.

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Simply because we've learned a lot in 40 years about making quality castings; we have four complete plants; modern inspection techniques; close metallurgical control.

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(Continued from page 70)

and finders, and ample bearings.

The screw drivers are available in series 000 for driving small screws up to No. eight free-running or No. five self-tapping; series 00 for medium screws up to 1/4 in. free-running or No. 10 self-tapping; and series 0 for large screws up to 5/16 in. free-running, or 1/4-in. self-tapping. Reversible and non-reversible models are made in each series, and the two larger series can be had with either straight or pistol grip handles. Thirty-eight sizes are available for all speeds and capacities.

F-88—Miniature Pivot Ball Bearings



Made by Miniature Precision Bearings, Inc. in Keene, N. H., this new miniature pivot ball bearing has an OD of 1.5 mm. Diam. tolerance, held to plus zero and minus two ten-thousandths of an in., is achieved by instruments accurate to 20 millionths of an in. The pivot shaft holds the balls in place. The raceway wall itself is designed so that its mass occurs at points of greatest strain. This permits relatively heavy loads under severe conditions of shock and vibration. These miniature ball bearings are rapidly replacing jewel bearings for instruments used under such conditions. Photo shows portion of common pin, left, and four pivot ball bearings.

F-89—Metal Fasteners

The Driv-Lok Pin Co., Sycamore, Ill., has recently introduced Lok Dowels—a precision grooved pin which is said to provide a method of establishing and retaining alignment between component parts of any mechanical device, machine components, dies, jigs and fixtures.

Standard Lok Dowels are made of cold drawn steel, centerless ground and
(Turn to page 74, please)

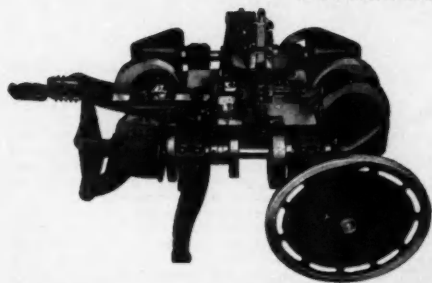
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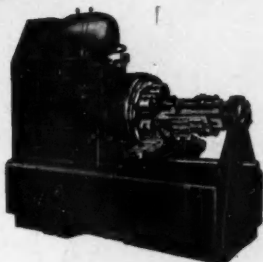
invaluable to Prime and Subcontractors



BAIRD 4 SLIDE MACHINE

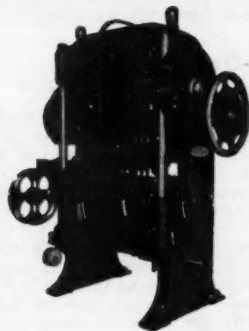
The FOUR SLIDE (above) is a basic design machine . . . stocked and tooled to your specific requirements for repetitive production of wire forms and coiled stock work . . . almost unlimited in scope. Operation entirely automatic. Eight standard sizes cover wire diameters 1/32" to 1/2" and ribbon widths 3/16" to 1-3/8" . . . larger capacities on special order. You will find extra profits on your cost sheets with this machine in your plant.

The four Baird machines shown on this page have been time-tested in many of the leading industrial plants of this and other countries. Their high speeds, multiple production features, and wide variety of tooling possibilities spell cost reductions thru high production and man-power savings. Automatic operation, wherever possible, has been designed into each unit as well as provisions to facilitate fast set-up. Check each machine . . . then . . . "ask Baird about it".



BAIRD 76H CHUCKER

Completely automatic with 5 longitudinal and 5 cross slides, open construction for easy access to all tooling . . . fast set-up. Automatic operation of chucks does away with levers, valves, gages . . . leaves both hands free. Safety devices give full protection. There are many combinations of spindle speeds . . . all tool slides independently operated. Machine keeps young in performance, even when old in years.



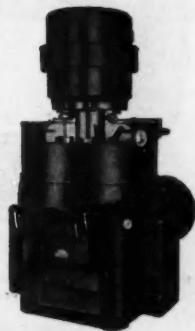
BAIRD MULTIPLE TRANSFER PRESS

Simply stated, this press combines, in one cycle, operations that might otherwise require several smaller machines with operator for each. It feeds coil stock for piercing, lettering, embossing . . . then cuts the blank, places it in transfer fingers, moves it to several tool stations, ejects it . . . all automatically. Ask us for Case Histories Bulletin.

BAIRD 5.4 VC LATHE

Continuously revolving turret eliminates non-productive indexing time in wet, dry cutting of light jobs, boring, facing, turning, etc. Tools feed both on "in" and "out" of cutting stroke. A most versatile tool for work within its range.

Bulletins on all above on request.



the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

NEW PRODUCTS

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(Continued from page 72)

polished. Four parallel grooves impressed along half the length of the dowel displace metal to each side of

the groove. No chip is removed. When the dowel is forced into a hole, the crests of the eight flutes are substantially forced back into the grooves, but the resiliency of the metal sets up out-



Exclusive features protected by U.S. patent Nos. 1958725, 2140818 and 2230471.

The unrivaled service life of Aetna T-Type Clutch Release Bearings has always made them the most economical in the long run. Once installed they are trouble-free, attention-free for vehicle life. Thanks to their patented design and self-lubricating features there's no need of costly machining operations for oil lines or grease fittings—no need of further maintenance whatsoever. Think what that saves in man and machine hours on the assembly line, in saving upkeep costs for the vehicle owner.

It's a trusty sign of dependability and economical performance in any vehicle—the famous Aetna T-type bearing. Investigate. Find out the many other sound reasons why Aetnas deserve a place in your specifications.

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Aetna

In Detroit: SAM T. KELLER, 2457 Woodward Avenue

T-TYPE Clutch Release BEARINGS

WITH THE... THAT TAMES TROUBLE

ward radial forces that lock the grooved portion of the dowel in place.

For installation the mating parts are clamped or fastened in the desired position, a slightly under size hole is drilled to proper depth, reamed to precise size and the Lok Dowel is pressed or driven into place.

F-90—Shelf-Type Lightweight Truck



A light duty truck with smooth steel shelves is being produced by the Materials Handling Div., Market Forge Co., Everett, Mass.

These trucks can be built to meet individual requirements. They are furnished with any size or type of caster and wheel. The lips of the shelves can be supplied turned up or turned down.

Specifications of the two models illustrated are: Large truck—width 24 in., length 54 in., wheels five in. diam semi-steel. Small truck—width 24 in., length 40 in., distance between shelves six in., height 18 in., wheels six in. diam. semi-steel.

F-91—Portable Drying Unit

Fostoria Pressed Steel Corp., Fostoria, Ohio, has added another Dura-bake portable drying unit to its line. This unit, Model 86-848, features the Evenray radiant wall. It is designed for drying enamels, lacquers, and undercoats on either passenger cars or commercial vehicles. Areas up to 40 sq ft can be handled by the unit.

F-92—Oscillograph Recording Camera

A modification of the Kodak high speed camera which permits both the mechanical and electrical aspects of a subject to be recorded simultaneously on the same film has been announced by the Eastman Kodak Co., Rochester, N. Y.

The modification consists of the addition of a second lens to the camera to record the images on the tube of a cathode-ray oscillograph through the back of the film, while the mechanical aspects of the subject are being photographed on the front. The record permits presentation of a complete picture of the behavior of electro-mechanical devices, and will also permit correlation with strain, acceleration, vibration, and other signals fed to the oscillograph in many non-electrical problems.

(Turn to page 76, please)

"DETROIT" Universal Joints...



... Built for Today's High Torque Engines

Few parts of a car are subjected to as much punishment as the drive train. This is especially true because of the powerful engines now used in cars and trucks. Yet the quality built into "DETROIT" Universal Joints enables them to take these extra loads.

Detroit



UNIVERSAL JOINTS



UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan



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Silent running instruments and machines keep our submarines safe. Behind the manufacture of these fine products lie months of research with Magnecord tape recorders . . . noise analyses and vibration tests to reduce detectable sound.

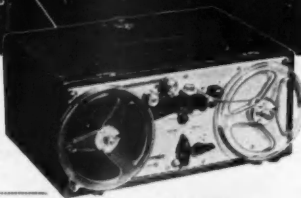
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Used by more engineers than all other professional tape recorders combined



(Continued from page 74)

Inasmuch as the film is traveling in a vertical direction the horizontal deflecting circuit alone is used. The film speed, as indicated by the edge-marking argon lamp in the Kodak high speed camera, provides a time base if necessary.

Exposure of the oscillograph trace is continuous, not intermittent like the exposure of the picture image. On any given picture frame, the midpoint from top to bottom of the trace coincides with the midpoint of the exposure time of the picture image. The entire trace from top to bottom of the frame represents a time interval equal to the reciprocal of the picture frequency. This is five times the picture exposure time.

The Machinery Industry

(Continued from page 56)

The industry reports that part of the present problem of raw materials procurement is caused by the fact that many machine tool firms customarily buy from steel warehouses rather than directly from steel mills. Compared to other capital goods industries, the machine tool producers are not large buyers of steel—although a wide variety of metal items are normally purchased—so steel purchases from warehouses are necessary.

Non-Defense Orders

Machine tool builders report a high proportion of non-defense rated orders on their books. While there is as yet no Government prohibition against machine tool builders accepting non-defense contracts, an industry recommendation is that steps be taken to correct the situation.

Builders still want a list of the relative essentiality of Government and defense orders. In the absence of such a list, the machine tool manufacturers are being called upon to make arbitrary decisions as to which defense-rated contract should be produced first.

Expansion

According to the latest release put out by the Defense Production Administration, certificates of necessity have been issued to 486 manufacturers of machinery and components for a proposed investment of \$389 million. Tax amortization allowed, in relation to the proposed investment, averages 68.3 per cent.

The problem of training users of their balancing machines has prompted Gisholt to establish the Gisholt Balancing School. Not much information on balancing is available in colleges or trade schools, so the course has been set up at the plant in Madison, Wis., for the benefit of customers.



Hydro-Lectric Push-Button Tops Brought Back the Convertible!

Convertibles—always popular with a certain segment of the driving public—were given a terrific sales boost with the development of Hydro-Lectric top operating mechanisms. The ability to raise or lower the top at the touch of a finger made the convertible an *all* season model appealing to *all* age groups in *all* sections of the country.

Detroit Harvester pioneered this convenience as well as improvements in the top mechanism itself—snugger fit, reduction of unsightly linkage and elimination of binding through the perfect equalization of hydraulic effort on both sides. The same Hydro-Lectric power unit which operates the top can motivate all windows, driver's seat, deck lid, and hood.

Over a million
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systems prove their
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HOUGHTON PRODUCTS FOR THE METALWORKING INDUSTRY: Cutting Oils and Bases, Drawing Compounds,

Houghton man's hat there's help for you...

• Getting out into the shop as Houghton men are invited to do, they meet up with a whole lot of metalworking problems.

They're continually called on for help in solving problems like these: meeting high physicals in the heat treatment of "lean alloy" steels ... boosting machine output and reducing rejects ... developing lubrication that stands up under all operating temperatures ... cleaning metals faster at lower cost ... preventing idle equipment from rusting ... deep drawing safely at extreme pressures ... and so on.

By working on such a wide variety of problems Houghton has accumulated a lot of metalworking "know-how". We keep careful tabs on success stories through research data and field reports. And all of this information is constantly studied to find out how it can be more widely applied to help the whole metalworking industry.

Because of this vast metalworking experience Houghton men are called on repeatedly for aid—particularly by plants faced with unfamiliar conversion problems. Two-thirds of our sales and research organization today, are vet-

erans of World War II production experience.

Now another rearmament program is getting into full swing. Changes on the production line are popping up again. And Houghton men are busy helping customers lick today's problems.

Your Houghton man can help you with many of your problems right on the spot. He can also draw on the wealth of production data our research staff has at its fingertips. For example, the list at the left shows some typical help we can offer on defense production today.

Meantime, to make some of our extensive experience immediately available to you, we have put it into quick reference form. Called "Houghton Defense Production Data", this 60-page illustrated book provides you with information that may save endless hours of searching—and costly trial-and-error experimenting.

Get timely help with your conversion problems by sending today for your copy of this valuable book. Fill out and mail the coupon to E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pa.



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Please send us a free copy of the new 60-page book,
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Metal Cleaners, Rust Preventives, Foundry Core Binders, Quenching Oils, Salt Bath Materials, Lubricants and Greases

Observations

By Joseph Geschelin

Readers of AUTOMOTIVE INDUSTRIES will recall the article some time ago announcing the introduction of the technique of Marquenching at the Fort Wayne Works of International Har-

vester Co. Recently we learned of an unexpected sequel to this process. It now appears that the fine quenching oil used in the process is eventually filtered and rectified, then treated with

suitable additives to produce what is claimed to be an excellent heavy duty EP rear axle lube.

Latest development on the horizon for increasing the rate of chip removal is jet cooling. You will hear more about it in a few months—it's confidential for the moment. Whatever the details are, the new technique is claimed to offer an enormous increase in cutting speeds and productivity as well as a great extension of tool life between grinds. Assuming that jet cooling will prove to be a real commercial practicality, it comes at just the right time to meet the problems of war production.

Recent visit to Aluminacast in Chicago opened our eyes to remarkable advances being made in scientific equipment for research and production control. What caught our fancy was an installation of the remarkable direct reading spectrograph made by Applied Research Laboratories. Capable of providing a complete analysis of aluminum and magnesium samples on a chart in a matter of seconds, it records traces as small as 0.001 of one per cent with precision.

We noted recently some comment on a technique of great promise to designers. We refer to some work being done in making certain kinds of large aluminum parts in the form of permanent mold sections or laminations, the latter being securely brazed under pressure to make up the assembly. The objective is to reduce the cost of intricately cored parts, producing at the same time a superior product.

Speaking of high speed machining, Nash in Kenosha has been operating for some time one of the big 16-in. Fay hydraulic automatic lathes for turning rear axle pinions. The pinion is milled to length, then presented to this machine in the as-forged state. It is machined to finish dimensions, using multiple tools, in a matter of 30 seconds. Solid carbide tools remove from two to three pounds of metal at the rate of 1150 sfpm.

An unexpected byproduct of a good statistical control system, warns an executive who installed a good one some time ago, is a tendency for supervision to get careless when things are going well. Our friend discovered that his foremen were taking it easy, short-cutting their job of supervision just because rejections had fallen off. His cure was to start a school for supervision and actually retrain his seasoned foremen to fit the new scheme of operations.

Highest Precision

HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature *is*. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown
PRESIDENT



Parts Include...
King Pins
Shackle Bolts
Shackle Pins
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Idler Shafts
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Export Department: 38 Pearl St., New York, N. Y.

World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES



Air and Vacuum
POWER BRAKES



Air and
Electro-Pneumatic
DOOR CONTROLS



CALENDAR

OF COMING SHOWS AND MEETINGS

- Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, OhioOct. 1-4
- SAE National Aeronautic, Production Forum, and Display, Biltmore Hotel, Los Angeles, Calif.Oct. 3-6
- Paris Automobile Show, Paris, FranceOct. 4-14
- 36th International Motor Exhibition, London, EnglandOct. 17-27
- National Metal Congress and Exposition, Detroit, Mich.Oct. 15-19
- NAM Institute on Industrial Relations, Lake Placid, N. Y.Oct. 15-19
- ASTE South Central Conference, Evansville, Ind.Oct. 19-20
- SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill.Oct. 29-30
- SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill.Oct. 29-31
- AGMA Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.Oct. 29-31
- SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago, Ill.Oct. 31-Nov. 1
- National Tool & Die Manufacturers, St. Louis, Mo.Nov. 1-4
- American Petroleum Institute (31st Annual Meeting), Chicago, Ill.Nov. 5-8
- Second Annual Motorama, Los Angeles, Calif.Nov. 7-11
- American Society of Mechanical Engineers (annual meeting)Nov. 25-30
- Ninth Annual Pittsburgh Diffraction ConferenceNov. 29-30
- Motor and Equipment Wholesalers Ass'n (Annual Convention) Chicago, Ill.Dec. 5, 6, 7

1952

- Brussels Automobile & Truck Show, Brussels, BelgiumJanuary
- 42nd National Motor Boat Show, New York CityJan. 11-19
- Plant Maintenance Show, Phila., Pa.Jan. 14-17
- SAE Annual Meeting, Detroit, Mich.Jan. 14-18
- Society of Plastics Engineers, Inc. (eighth annual technical conference), Chicago, Ill.Jan. 16-18
- National Transport Vehicle Show & Fleet Maintenance Exposition, New YorkFeb. 26-28
- Pacific Automotive Show, Los Angeles, Calif.Feb. 28-Mar. 2
- ASTM Spring Meeting, Cleveland, OhioMar. 3-7
- Fifth National Plastics Exposition, Phila., Pa.Mar. 11-14
- Geneva Automobile & Truck Show, Geneva, SwitzerlandMar. 20-30
- American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show Cleveland, OhioApr. 7, 8, 9
- Western Highway Institute, Palm Springs, Calif.Apr. 17-19
- API Div. of Refining, San Francisco, Calif.May 12-15
- American Society for Quality Control (sixth annual meeting), Syracuse, N. Y.May 22-24
- American Society for Testing Materials (annual meeting) New York CityJune 23-27



balance



smooth slip



long-life action

Spicer assures exceptionally long wear-life and trouble-free service through adequate needle bearings...close-fitting, free-sliding splines...and true-running tubular shafts. Spicer Manufacturing Division of Dana Corporation, Toledo 1, Ohio.

Spicer

UNIVERSAL JOINTS

TRANSMISSIONS • CLUTCHES • PARISH FRAMES • SPICER "BROWN-LIPS" GEAR BOXES PROPELLER SHAFTS • STAMPINGS • FORGINGS TORQUE CONVERTERS • PASSENGER CAR AXLES • UNIVERSAL JOINTS • RAILWAY GENERATOR DRIVES • POWER TAKE-OFFS

NBS Research on Detonation

(Continued from page 37)

ing the zero setting on the micrometer used to measure the cylinder height, compression ratios in excess of 18 to 1 have been made possible. The dynamometer maintains engine speed at 600, 900, 1,200 or 1,800 rpm. The temperature of the cylinder jacket can be maintained constant at any temperature between 150 and 212 F.

From the NBS study, two distinct stages in autoignition have been recog-

nized. In the first stage a low-intensity blue luminescent glow is apparent. This is followed by a sharp rise in light emission as the reaction goes into the second stage, during which detonation occurs. A small increase in pressure accompanies the emission of light in the first stage. At the start of the second stage, light emission and pressure both increase sharply until the reaction is complete.

Experiments have been carried out at NBS on several fuels of various chemical structures. In this way, processes occurring during the first stage of autoignition have been related to the detonation tendencies of the individual fuels. It was found that fuels of low octane number start to burn more readily when compressed as end gas than do those of high octane number. This is in contradiction to one of the tenets of a currently popular theory regarding initiation of combustion. According to this theory, those hydrocarbons having tertiary hydrogen atoms should begin to burn more readily than those with secondary and primary hydrogens. Yet many of the higher-octane fuels containing tertiary hydrogens were found more resistant to burning than those containing only secondary and primary hydrogens.

A correlation was also found between the amount of heat liberated in the first stage of autoignition and the detonation characteristics of the fuel. High-octane fuels did not liberate as much heat as low-octane fuels, and the amount of heat liberated was discovered to be an inverse function of the performance number for several of the fuels studied. These results definitely show that the reactions occurring in the first stage of autoignition have an important bearing on the tendency of the fuel to detonate.

In the first stage a relatively slow oxidation takes place which is presumed to be a chain reaction. The extent of this reaction and the ease with which it starts are increased by the presence of peroxides, which are known to be easily decomposed to free radicals. The free radicals act as chain initiators and carriers, causing more of the fuel to be burned in this stage of combustion. As a consequence, there is a greater tendency for fuels to detonate if they contain peroxides.

The second stage also appears to be a chain reaction, although probably not of the same type as that occurring in the first stage. The process is visualized as being initiated partly by the effects of the active particles generated in the first stage. If the first stage produces a large concentration of active particles, then the second stage would be expected to progress more rapidly toward detonation. The overall activity of the particles generated in the first stage may be governed by two factors: one is the population of the particles; the other is the activity of each individual particle, which is probably a function of the temperature and pressure.

Research on the burning mechanism of fuels is continuing at NBS. The ultimate objective of the program is to gain a more thorough understanding of knock and how it is produced. It is expected that results will eventually be obtained which will point the way toward more efficient utilization of automotive fuels, either through the improvement of engines or fuels, or perhaps of both.

BALLS FOR BEARINGS AND OTHER BALL APPLICATIONS



Precision balls made for your job — available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations.

THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

DETROIT W. S. BRADY 443 NEW CENTER BLVD.	CHICAGO FREDERICK H. CLARK 425 N. WASHINGTON BLVD.	NEWARK, N. J. GUARANTEED TRUST CO. 317 BRIDGE ST.	LOS ANGELES, CAL. E. B. WALSH CO. 1718 SOUTH FLOWER ST.	EXPORT R. J. HODGINS, INC. 55 W. 52ND ST., NEW YORK
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IN COLD FORMING!**

GET YOUR FREE BULLETIN TODAY!



Automotive drive shaft, produced by cold forming with aid of Bonderite and Bonderlube. Saves steel, machine time, man hours.



Showing the progressive stages in cold drawing of steel 50 cal. cartridge cases, with aid of Bonderite.

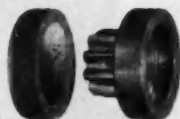
BONDERITE

AS AN AID
IN
COLD FORMING

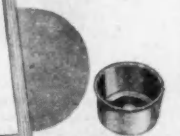
BONDERITE FACILITATES COLD FORMING

Bonderite treatment of steel, stainless steel, or aluminum converts metallic surfaces to a non-metallic, coating of proper texture to retain lubricant and facilitate drawing, extrusion, and cold forming of metal. The use of Bonderite prior to cold working reduces metal to metal contact, prevents heat life, permits faster drawing speeds and greater reductions, reduces material wastage, and gives a surface free of scoring, improving the finish of the product.

A TECHNICAL PUBLICATION FROM
PARKER RUST PROOF COMPANY • DETROIT 11, MICHIGAN



Close tolerance gear, with excellent physical properties, formed from Bonderite-treated coiled blank in one extrusion.



Steel washing machine tub, drawn from sheet steel blank with aid of Bonderite.

SEE EXAMPLES AT OUR BOOTH
H339, METALS SHOW, DETROIT

... FILLED WITH TIME, METAL, AND MONEY SAVING FACTS LEARNED IN PARKER'S 10 YEARS' EXPERIENCE IN THIS FIELD. Technical bulletin, illustrated, tells you how new Parker developments in products and techniques can help you make "impossible" draws and extrusions become economical production realities. A valuable book for executives, engineers, production men. Get your copy now!

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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*fill in and
mail Coupon
today!*

CHECK
type of metal you
are interested in
cold forming.

STEEL ☐
ZINC COATED ☐
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Please send me, by return mail, my FREE copy of technical bulletin "Bonderite As An Aid in Cold Forming."

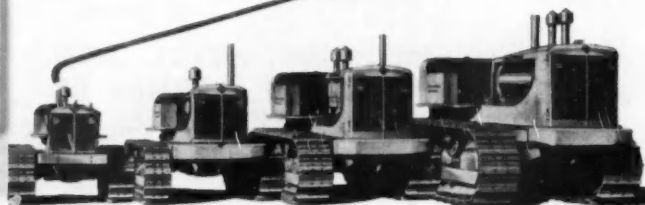
NAME _____
TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

UNITED OIL BATH AIR CLEANERS

Are Standard on Allis-Chalmers New Tractor Line

From the versatile 11,250-lb. HD-5 to the towering 41,000-lb. HD-20, all four models in the new Allis-Chalmers tractor line are protected by United Oil Bath Air Cleaners. These powerful track-type tractors, each a standout in its size class, are assured of the most thorough air cleaner protection possible—a time-proven protection which efficient United cleaners are furnishing daily for millions of internal combustion engines in every conceivable type of operation.

Here are the dual cleaners with pre-cleaners designed for the new Allis-Chalmers HD-20.



HD-5
40.26
drawbar hp.
11,250 lb.

HD-9
72
drawbar hp.
16,800 lb.

HD-15
109
drawbar hp.
27,850 lb.

HD-20
Hydraulic Torque Converter
Drive — 175 net engine hp.
41,000 lb.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION • CHICAGO 28
MITCHELL DIVISION • PHILADELPHIA 36
BIRMINGHAM 11, ALABAMA

★ AIR CLEANERS ★ METAL STAMPINGS ★ DOVETAILS
★ IGNITION AND TURN SIGNAL SWITCHES ★ ROLLED SHAPES

Pontiac's New Building

(Continued from page 33)

is so located as to provide natural north light throughout the day. Good seeing with artificial light is afforded by an installation of fluorescent recessed fixtures providing illumination of 65 ft candles at work places. Illumination of 50 ft candles is supplied in offices; and 38 ft candles in the machine shop.

Among the more unusual and advanced facilities found here are the radio laboratory and the cold test room. Designed by specialists in their field, both laboratories have outstanding features of construction.

The radio screen room, which also serves as an electrical laboratory, has many unique design features such as solid copper sheathing on the exterior and interior surface of special kiln dried and treated wood framing, and a glass block floor. It is designed to eliminate external electrical interference in the range from 500 kc to several hundred megacycles.

The cold room too boasts special design and equipment features, one of the most prominent being the refrigerating system which is capable of being defrosted without shutting down the operation. This has been accomplished through the installation of two sets of evaporating coils, one of which may be defrosting while the other is cooling. Both automatic and manual controls are provided.

The cold room has its own self-contained refrigerating equipment with a capacity of 40 tons of refrigeration at minus 20 F suction temperature and 95 F condensing. It can maintain a temperature of minus 10 F with 95 F ambient, with one car and three people in the room, taking 450 lb of outside air per hour.

The first floor plan features a centrally located driveway which facilitates the movement of test cars in and out of the repair garage, directly from the outside and without interfering with the working areas. It is also of interest that facilities for washing cars are located at the entrance to the driveway in the rear, making it convenient to remove dirt and mud and snow in winter operation, thus promoting good housekeeping at all times.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of
Automotive and Aviation

MANUFACTURING

WHY SODIUM COOLED VALVES LAST LONGER

FIG. 1

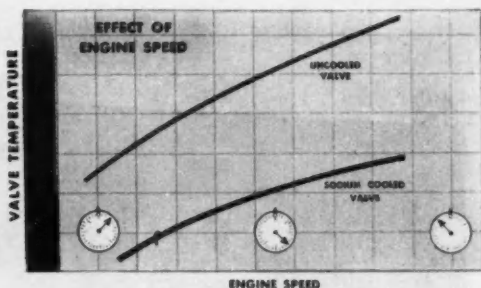
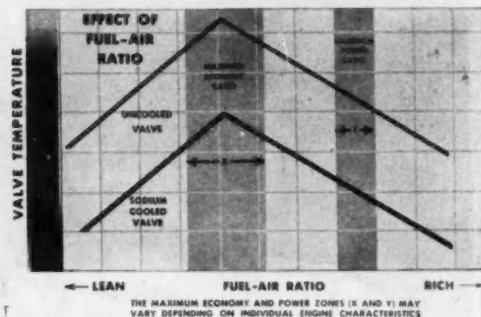


FIG. 2



The trend in modern engine operation is toward higher speeds and more economical fuel-air ratios, resulting in higher temperatures for many operating parts.

Higher temperatures of exhaust valves, for instance, are the dominant factor limiting valve life, sharply reducing the valve material's resistance to corrosion and distortion, and definitely limiting its life under fatigue conditions. Reducing valve temperatures, therefore, lengthens valve life amazingly; this is best accomplished by internal cooling as shown in the accompanying graphs based on recorded test data.

Fig. I shows effect of internal cooling of valve over the engine speed range. Fig. II shows lower valve temperatures of the sodium cooled valve for various air-fuel ratios.

Eaton engineers will be glad to work with you in applying the benefits of sodium cooled valves to your engines.

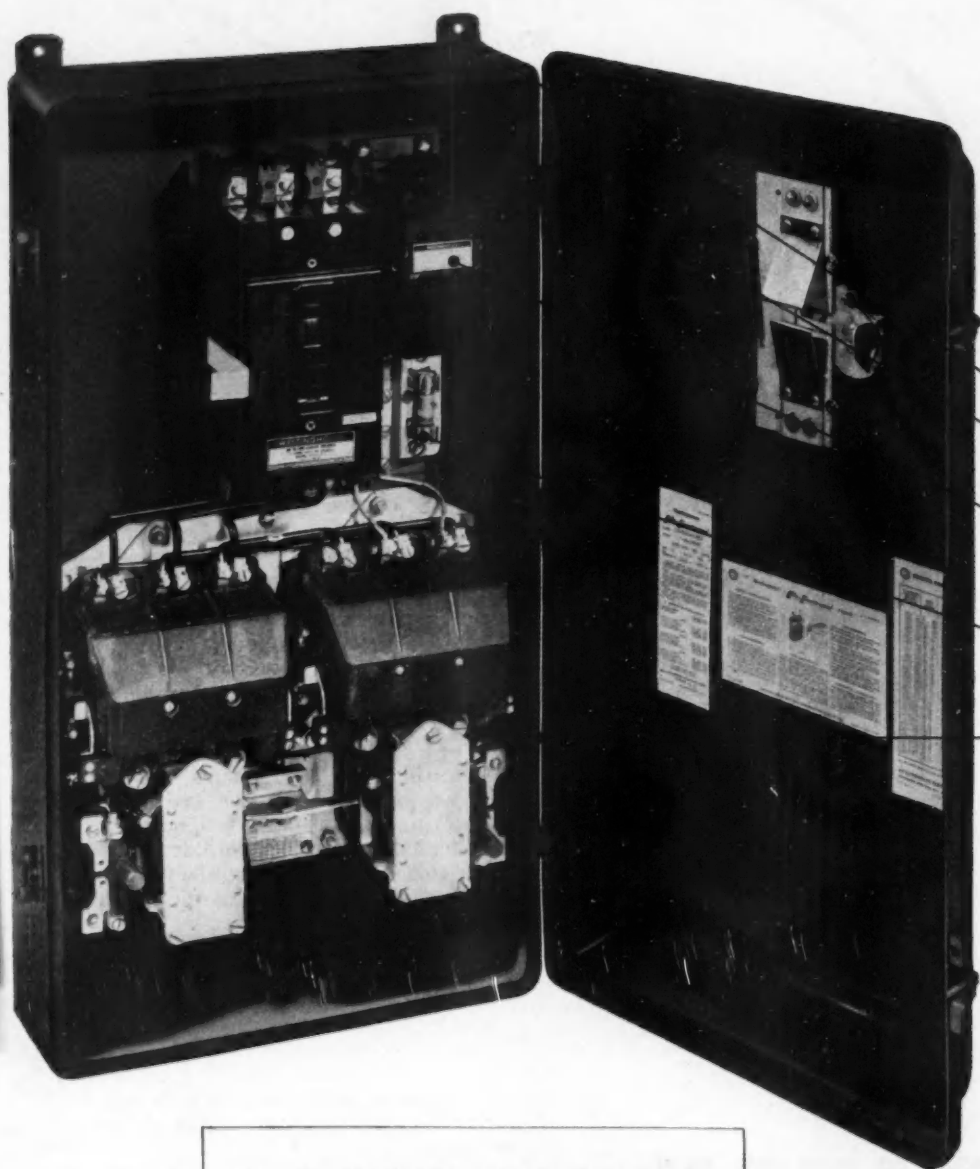
EATON

MANUFACTURING COMPANY
CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Class 11-216-NJ25, Reversing Combination Life-Line starter with Circuit Breaker per JIC Specifications, NEMA Type XII Enclosure, Size 2.

MORE MOTOR STARTER

than your committees specified

JIC Standards have been established by your own committees for the Automotive, Machine Tool and Mass Production Industries. They've set high and desirable standards. Westinghouse Life-Linestarters are built to the new JIC Standards and also include our own performance features that make for personnel safety, uninterrupted production, longer equipment life.

HERE'S WHAT JIC STANDARDS INCLUDE:

- ★ **EXTERNAL MOUNTING FEET** help eliminate enclosure openings and facilitate quick and easy hanging.
- ★ **NO KNOCKOUTS** in enclosure—a further safeguard that keeps out oil, dust and dirt.
- ★ **CONTROL CIRCUIT TRANSFORMER WITH DUAL-VOLTAGE PRIMARY** enables starter to be used on either 220 or 440 volts, 60 cycles, with 110-volt control circuit.
- ★ **CONTROL CIRCUIT** is protected by fuse in transformer secondary circuit.
- ★ **CONTINUOUS NEOPRENE GASKET** that helps exclude oil, dirt and dust.

HERE ARE WESTINGHOUSE PLUS FEATURES:

SLAMPROOF HANDLE MECHANISM... protects Breaker against rough treatment... interlocked design keeps cover closed when handle is in either ON or OFF position. Sure-grip handle of high-strength alloy must be moved beyond OFF to the OPEN COVER position to open cover.

"DE-ION"® ARC QUENCHER... lengthens contact life and cuts maintenance... destructive arc is confined, divided and quickly extinguished in ½ cycle or less.

NO COVER RESETS... eliminate possible entrance of oil and dust... also prevent tampering by

unauthorized personnel. Retained cover screws hold cover tightly closed against gasket.

INTERLOCKED CONTACTORS... contactors are electrically, as well as mechanically interlocked.

Add these and other Westinghouse standard features to new improved JIC Standards and you get a Linestarter that's loaded with positive protection for personnel, production and equipment. Get all the information about the new Reversing Combination Life-Linestarters with plain disconnect, fusible disconnect or Circuit Breaker. Your nearby Westinghouse representative has the answers; or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.


J-30074

YOU CAN BE SURE... IF IT'S

Westinghouse

Life-Line

MOTORS and CONTROLS



LIPE AUTOMATIC BAR FEEDS

MAGAZINE LOADING

Doubled PRODUCTION!



The machined worm wheel shaft and agitator rod shown below are typical of the many parts turned out on a bank of seven screw machines equipped with Lipe AML Bar Feeds at Hamilton Beach Division, Scovill Mfg. Co., Racine, Wis., manufacturers of food mixers, vacuum cleaners, hair dryers and other motorized appliances.

No lost time in loading and hand feeding! . . . No scratching of high-finish stock! . . . No idle operation of screw machines! . . . Maximum production capacity fully maintained!



Long worm wheel shaft .3125" dia. machined from piston rod finish, cold-drawn steel. When the Lipe AML Bar Feed automatically loaded and fed the stock to a Model 20 B&S, production increased 100% over conventional loading operation.



Agitator rod .250" dia. machined from S.A.E. #1112 Bessemer wire. When the Lipe AML Bar Feed automatically loaded and fed the stock to a Model 00G B&S, production increased 100% over conventional loading operation.

On job after job there is proof—like these examples from a typical four-week production run—that Lipe Automatic Bar Feeds insure big production gains, BECAUSE:

- Stock is fed to screw machines all the time . . . not dependent on operator.
- Pressure constantly behind stock.
- Eliminates feed fingers.
- Avoids multiple feed finger feedouts.
- Model AML gives maximum output of machine . . . no "cutting air."
- Saves changeover set-up time.

Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers will gladly study your problem . . . no obligation.



LiPE - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machining Tools
Syracuse 1, N. Y.

Torqmatic Transmissions For Tanks

(Continued from page 53)

stock or installed on an entirely different type and make machine.

The sequence of operations in this machine may be outlined briefly as follows:

Operation	Station
Drill 2, 0.2610 in. holes in pad	1
Counterdrill 2.164 in. diameter	
Drill 1/8 in. hole at 30 deg angle, 1 15/16 in. deep	2
Drill 1/8 in. hole through on 60 deg angle	3
Drill 7/16 in. hole, 2 1/2 in. deep on 30 deg angle	4
Drill 9/32 in. hole through on 60 deg angle	
Drill 1/8 in. hole, 1 15/16 in. deep on 30 deg angle	
Drill 1/8 in. hole, 1/8 in. deep on 30 deg angle	
Drill 1/8 in. hole, 2 1/2 in. deep on 28 1/2 deg angle	5
Drill 1/8 in. hole, 3 1/2 in. deep on 17 deg angle	6
Drill 1 1/4 in. hole through pad on 22 1/2 deg angle	7
Drill 1/8 in. hole, 6 in. deep, on 30 1/2 deg angle (plus or minus 1/2 deg)	

Another of the "firsts" in this plant is a new model of the famous Pratt & Whitney profiler. Allison has a battery of 14 of these hand-operated machines. As illustrated, most of the machines are fitted with suitable metal templates for guiding the tool in profiling the outline of pads and recesses of various kinds in the big transmission cases. The new machines are of rigid, heavy duty construction which, together with a massive spindle, make it possible to hold close tolerances, particularly in reaching deep recesses and pads.

A large battery of unusually big and massive Heald Bore-Matics has been set up for precision-boring various bores, holding size and axial alignment within extremely fine tolerances.

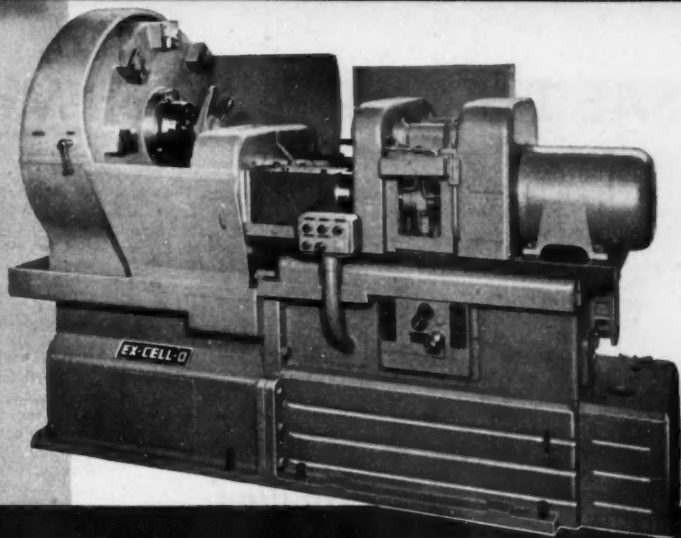
Small Cars Dominate

(Continued from page 36)

at top speed. The engine is delivered with chassis, the body to be constructed by a coachmaker of the buyer's choosing.

The largest national exhibitor at the show was the United States with 33 models. England presented 22 types, the stellar attraction of which is the Jaguar XK120 sport car with a tested speed of 130 mph. Italy was represented by three firms, Alfa Romeo, Lancia and Fiat; and France, four. Czechoslovakia, the only Iron Curtain country to participate, displayed her stand-bys, the scarcely changed Tatra and Skoda.

Ex-Cell-O One-
Way Precision
Boring Machine.



5 OPERATIONS ON 8 HOLES IN LARGE JET PART

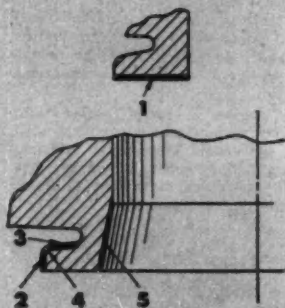
A TYPICAL **EX-CELL-O** SOLUTION TO A DIFFICULT PRODUCTION PROBLEM

THE JOB: a large jet engine part requiring complex precision machining.

THE MACHINE: Ex-Cell-O One-Way Precision Boring Machine equipped with two heavy duty spindles and a manually indexed fixture.

THE RESULT: five precision operations on eight large holes (a total of 40 operations). Net production—about three pieces per hour.

Operations performed are shown at left in heavy lines. The front spindle carries a facing head which feeds radially to face the front of the flange (1). The boring head of the rear spindle carries four tools, three of which are on slides. These successively (2) turn the O.D. of the flange, (3) back-face the flange, (5) taper-bore the I.D., and (4) plunge the radius at completion of the back-facing cut. For further information contact your local Ex-Cell-O representative or write direct.



Five operations are performed on each of eight large burner holes in this jet engine part.

EX-CELL-O CORPORATION

DETROIT 32,
MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD
PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS
PRODUCTION PARTS • DAIRY EQUIPMENT

SAE Tractor-Production Meeting

(Continued from page 51)

of machines have been in the field for the last three years which were basically the same as the present units.

The basic carrier, named the Uni-Tractor, utilizes 10-24 front wheel tires with a wheel base of 83 1/4 in. which lends itself to operate in corn and other row crops. In order to give the Uni-Tractor stability when driven without any machine mounted on it, the right hand wheel is cast in one piece includ-

ing the rim and brake drum. The wheel weighs approximately 440 lb less the tire. Brakes are 14 in. by 2 in. expanding shoe type and are individually actuated in each drive wheel.

The rear wheel, which is the steering wheel, is equipped with a 7.50-18 tire which is special in that it has guide ridges well out on either side. This wheel follows in the track of the left front wheel and we found that, in order

to better control the machine under muddy conditions, this type of tire is necessary. The single wheel is placed to one side in order to facilitate the mounting of the various units.

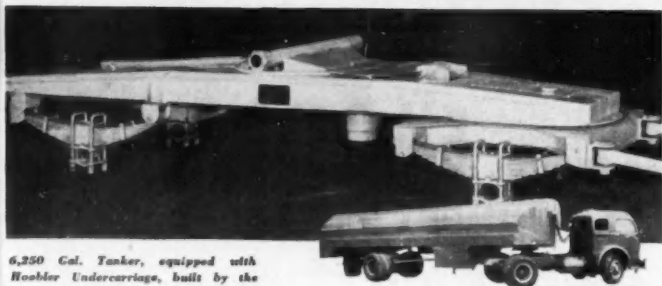
The power plant, Fig. 1, on the Uni-Tractor is a four cylinder, 60 deg V. engine developing 38 hp at 1500 rpm with a piston displacement of 206 in. It is unique in design in that the nature of the drives, the spare and weight limitations, together with the necessity of low manufacturing costs, resulted in a short, compact engine with a drive taken directly off each end of the crankshaft. To carry the belt loads, anti-friction bearings are employed on the crankshaft mains. To reduce tooling and manufacturing costs, a large percentage of the component parts are common with the model Z tractor which has been in production for a number of years.

A "V" design using a shaft having three crank pins was chosen for compactness. A 60 deg block angle resulted in less overall width, less vibration, and a smoother firing order of 120-180-240-180 deg as compared to 90-180-270-180 deg on the conventional 90 deg V. engines.

Many novel features were incorporated in the design such as a full floating oil pump mounted directly on the crankshaft to permit pressure to the rod bearings when anti-friction mains are used.

The engine is liquid cooled with pump circulation, and is complete with flyball governor, distributor ignition, starting motor, generator, and a hydraulic pump which is driven direct from the timing gears.

HOOBLER UNDERCARRIAGE Backbone for Heavy Hauling RESTS ON TUTHILL Alloy Steel SPRINGS



6,250 Gal. Tanker, equipped with Hoobler Undercarriage, built by the Union Metal Mfg. Company, Canton, Ohio. This is one of 36 Hoobler-equipped units operated by Standard Oil Company of Ohio.

Hauling a pay load of approximately 40,000 lbs. per trip and averaging 100,000 miles per year . . . is the astonishing performance record of this Hoobler Undercarriage, mounted on Tuthill Alloy Steel Springs.

It takes strength and stamina to stand up under the strain of such tremendous weight for so long. That's why . . . for third-axle heavy duty jobs, 6-wheel conversions, power shovels or busses . . . specially designed Tuthill Alloy Steel Springs are included in specifications.

Special Leaf Springs
designed to meet any
requirements.



TUTHILL SPRING CO.

760 WEST POLK STREET • CHICAGO 7, ILLINOIS

Bulldozer Power and Dimensions

By J. W. Martin and D. B. Folger
Bucyrus-Erie Co.

THE tractive effort applicable for moving dirt with the blade of a bulldozer may be limited by either engine horsepower or the ability of the tracks to transmit the applied power as a shear load to the ground. Shear resistance properties of the soil, therefore, impose one set of requirements on the track design with respect to the maximum tractive effort which can be developed, while additional requirements must be met for adequate flotation.

Once adequate flotation has been attained, one problem consists of transmitting the engine power to the tracks and from there to the ground. Starting at the engine, we have for each machine

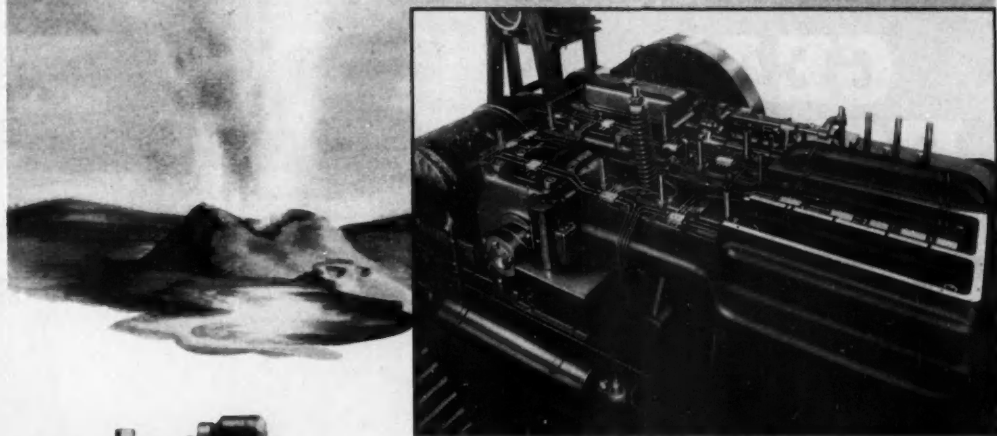
(Turn to page 96, please)

Do you know?...

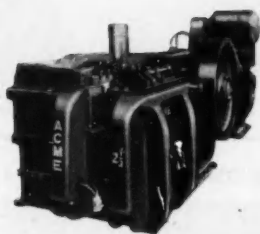
ACME XN PRODUCTION

NEVER STOPS

FOR LACK OF LUBRICATION!



*Detail view of automatic lubrication system.
Purchaser may select one of several makes.*



Every wearing surface on an Acme XN Forging machine is automatically lubricated with just the right amount of oil at just the right time. Acme XN Forging machines are equipped with a motor driven centralized pressure feed lubricating system by which a measured amount of lubricant is forced to every bearing and wearing surface of the machine. An adjustable time cycle at the central pumping unit, as well as adjustment in each valve, measures the exact amount of oil needed for each bearing. Years of added productive machine life are a certain result of this ACME XN feature.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 1209 W. 65th St., Cleveland 2, Ohio
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

Announcing the new

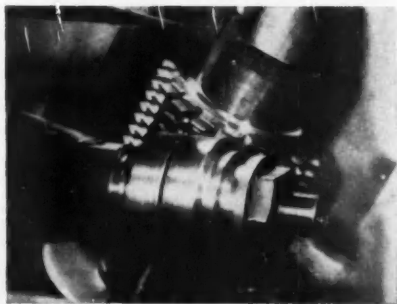
MICHIGAN

*High Production
High Speed*

**GEAR
HOBBER**

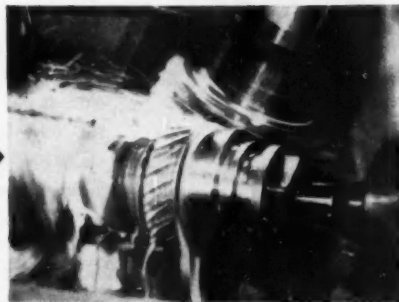


READY TO HOB TWO 3 1/8" GEARS



**Just before button is pushed
to start the cycle.**

15 SECONDS LATER



**Hob has completed its plunge cut
and transverse feed of work starts.**

Rounding out its complete line of gear production machines and tools, Michigan Tool is proud to announce successful completion of development and production testing of its spectacular new high-speed, high-production, single-spindle gear hobber—designed to make tomorrow's gear hobber requirements available today.

It employs a number of new design and operating principles developed and proven over a period of several years, all of which combine to give the Michigan Gear Hobber output rates which closely approach those of Michigan Underpass gear finishers and "Shear Speed" gear shapers.

For example, the Michigan Gear Hobber can finish-cut two 3½" diam. 9 pitch, (2 inch total face width) gears simultaneously to well within pre-shave tolerances, in a matter of 58 seconds, using high speed steel hobs.

For details, write for
Announcement Bulletin No. 1458A.



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•
Enables use of HSS hobs at practically 'carbide' speeds.

•
Hob speeds up to 1000 rpm or more available, if ever needed. (i. e., 1300 SFPM or more with a 5' hob)

•
Infinitely variable feeds at touch of a dial.

•
Gear accuracy virtually independent of machine operation.

•
Positive hydraulic dual feeds eliminate 2/3 of gears otherwise required.

•
Plunge feed replaces conventional approach feed; gives shorter total hob travel.

•
Torsional deflection and vibration eliminated, to all practical purposes.

•
Designed for push-button pre-selective hob shifting and automatic loading (optional equipment).

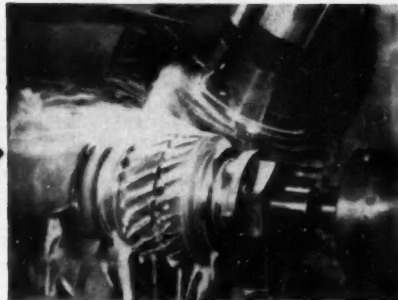
•
Quick positive setup, almost foolproof operation; high versatility.

•
One operator can easily run two or more machines despite high output rate.

•
Conforms to all JIC standards.

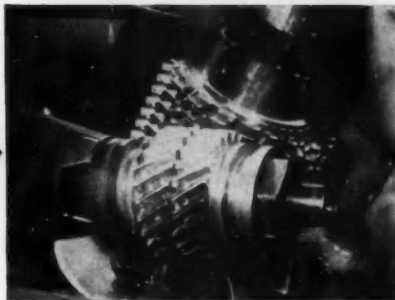
•
Rigid and compact.

... AT 37 SECONDS



Nearing the end of the climb cut.

FINISHED! IN 58 SECONDS



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hand you Plaskon Alkyd parts?

Whether you need a tote box full of parts—or box cars full—we can produce them. We'll take designing, tooling, and other chores off your hands, too. If you need parts with the excellent characteristics

of Plaskon Alkyd, our fact-and-figure men are eager to talk with you. Just write, wire, or phone.

Or if you prefer, our plane and pilot will speed you here for a time-saving chat about your parts problems.

No obligation, of course.

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Plastic Research Products, Urbana, Ohio

a known power available at the fly-wheel. This figure, however, is not directly related to dozer performance in that it does not represent the power available at the tracks for propelling the unit and performing other required functions. The power at the tracks is the tractive horsepower and it differs from the engine horsepower by the losses in the final gear train. This relationship based on data from three manufacturers, gives a fairly constant 92 per cent efficiency.

It must be realized that tractive horsepower or the tractive force derived from it are theoretical figures denoting the maximum power or force available at the tracks based on engine power and assuming 100 per cent traction. It is a value which can be established in the preliminary design without introducing the numerous unknown and variable factors which influence the transmission of the power to the ground.

Actual tractive forces are a function of unit weight, track proportions and the soil properties; consequently measured forces are meaningless without a complete specification of these factors. Actual tractive forces for different units are readily comparable only when they have been tested under duplicate conditions. Since the majority of the manufacturers' published data on tractive forces (or drawbar pull) are derived from the Nebraska Test in which these requirements are fulfilled, it might be argued that actual forces as found in these universal tests might be employed to compare units. The stumbling blocks are obviously the limitation to a single arbitrary soil condition and weights. Insufficient data are available for other soil conditions to permit a study of any basic relationships. The Nebraska Tests are made on the bare tractor and we are interested in the performance of the bulldozer as a unit with its additional weight. The average standard bulldozer weighs 20 per cent more than the bare tractor.

In view of these considerations, the theoretical tractive force or power must logically be used as the common yardstick for relating unit performance. For these correlations tractive horsepower has been based on first gear and full load engine speeds. In recent years second gear has often been recommended for dozer operation in the belief that higher speeds, at some sacrifice in tractive force, result in more efficient dirt moving. Since the choice of first or second gear has only a small influence on tractive horsepower, any basic relationships developed are not greatly modified. Tractive force in first gear seems desirable since we are primarily interested in the operation at peak loads.

The difference between theoretical and actual tractive force is track friction and rolling resistance. Track friction



A few of the 200 new Roto-Pac garbage trucks built by City Tank Corporation of Corona, L. I., for the City of New York. Mayari R steel is used in these truck bodies to combat corrosion.

200 More Garbage Trucks for New York Built of Mayari R

It's hard to think of an application where steel is given rougher treatment than in the body of a city garbage truck.

The moisture from oozing garbage, the acids and gases from decomposing vegetable matter, and the cutting action of abrasive refuse usually gnaw their way through plain carbon steel in a few months. Faced with this kind of corrosion-abrasion problem the Department of Sanitation of New York City began using truck bodies of Mayari R back in 1939. This low-alloy, high-strength, corrosion-resisting steel

did the trick. The bodies lasted years longer and required fewer repairs than those of plain carbon steel. Based on results like this, New York has bought several hundred Mayari R truck bodies since the initial order.

No matter whether you are a fleet operator or a builder of truck bodies, it will pay you to investigate the advantages afforded by Mayari R. Our Catalog No. 259 shows many truck and trailer applications, and it answers the technical questions you may have about the use of low-alloy, high-strength steel. Write for a copy.

BETHLEHEM STEEL COMPANY, BETHLEHEM PA.

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Low-Alloy, High-Strength Mayari R

- ▶ 5 to 6 times as much atmospheric corrosion-resistance as carbon steel.
- ▶ Almost double the yield point of carbon steel.
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Mayari R *makes it lighter... stronger... longer lasting*

tion may be thought of as a relatively constant retarding force for any particular machine, but rolling resistance, which includes clogging of the tracks, varies with the soil. Under normal operating conditions the rolling resistance requirements are relatively small. When the tractive conditions are poor, however, the power potential cannot be utilized and the rolling resistance, although still a small factor, may exceed the actual tractive power. Some idea of the order of magnitude of the combined power loss due to friction and rolling resistance can be found from the data supplied by two manufactur-

ers from which the difference in theoretical and Nebraska Test tractive forces can be compared to unit weight. Under these specific conditions the drag or reduction in force equalled on the average 280 lb per ton of vehicle weight.

If total bulldozer weight is plotted against the theoretical tractive force, the relationship of weight to maximum force which can be developed by the engine is established. These data, when plotted for the units surveyed, including all types of angled and straight bulldozers, result in the tapering band of Fig. 1. The various types of units followed no consistent trends, being

scattered generally over the entire band indicated. The plot shows several interesting things. First, the average theoretical tractive force for these machines cannot be expected to exceed 80 per cent of the unit weight. Second, the ratio of available force to weight varies

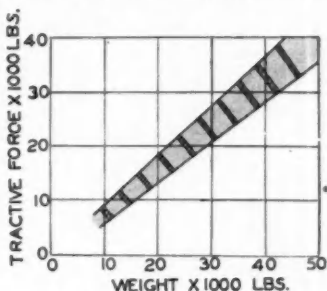


Fig. 1—Tractive force vs. weight.

through an appreciable range. This last is not believed to be so much a measure of effective weight utilization as representative of difference in opinion regarding the structure design to give the required strength and the

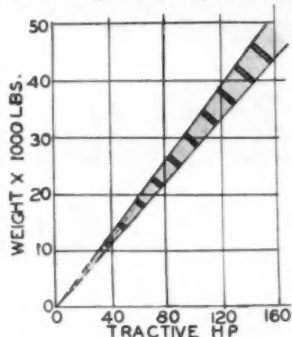


Fig. 2—Average weight vs. tractive horsepower.

weight necessary to provide the traction.

Weight can be plotted against tractive horsepower in a slightly different manner as in Fig. 2 to bring in the additional influence of tractor speed. The speed varied from 1.40 mph to 1.80 mph (2.02 for one small bulldozer) with an average of 1.58 mph. The curves are similar to those in the previous figure with some apparent reduction in scatter. The average weight per tractive horsepower is 296 lb. It is of interest to compare this with the 50 lb per hp and less for similarly rated bare Diesel engines.

The approaches to the study of traction have been many and varied, following a process of continuous refinement to the point where the tractive effort can be predicted with reasonable accuracy for any known vehicle and specific soil properties. In designing a unit to meet average conditions, the relationships which have been estab-



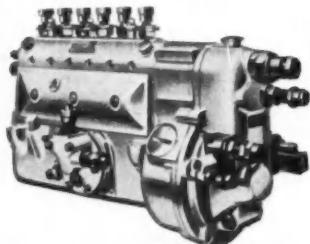
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By getting this "dormant" scrap off your premises and into the furnaces you'll be helping not only yourself but America as well. *More* scrap turned in, means *more* steel turned out—it's as simple as that. So let's get going.

To the mills, James -



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dealers listed in the yellow
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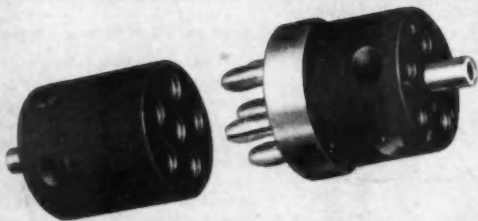
UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA STEEL COMPANY, SAN FRANCISCO
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SAE Meeting

(Continued from page 98)

lished are not directly applicable because the average conditions remain undefined. Track modification for various soil conditions is limited to changes in shoe width with no change in grouser height. The maximum available shoe widths can be employed only on the wide gage machines.

Farm Tractors and Implements

By R. B. Gray

U. S. Dept. of Agriculture

BECAUSE of the scarcity of petroleum fuels in the ERP countries, a large percentage of tractors made there are powered by Diesel or semi-Diesel engines—both two and four cycle and one, two, three, four, and six cyl engines—around 70 bhp being the maximum except perhaps in Italy where some 120 hp tractors have been built. Denmark, Holland, Belgium, Turkey, and Greece do not make agriculture tractors but many tractor manufacturers are active in England, France, Germany, Sweden, and Italy. In France and Germany and one or two other countries experiments are being conducted with methane produced with the ammonia from the manure of livestock. It is claimed that one gal of liquid fuel can be produced per head of livestock per day.

Some countries, such as France and Denmark, have been reluctant to replace their horses with tractors because of possible fuel shortages in the event of another war.

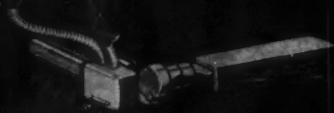
The Marshall Plan has materially aided these countries to get underway in supplying large numbers of tractors, farm machinery, and other facilities to help them meet their tractor and machinery needs. It might be of interest to note the tractor density in selected countries prewar, 1948, and 1951.

Tractor Density in ERP Countries

—Arable Acres Per Tractor
(Basic Data Compiled by ECA)

	Prewar	January 1948	January 1951
United Kingdom	245	80	58
Switzerland	110	105	60
Netherlands	490	230	148
Sweden	468	265	155
West Germany	875	327	165
Norway	735	375	206
Austria	2,900	920	295
Denmark	1,690	1,080	315
Belgium	2,030	1,323	366
Ireland	1,482	1,060	375
France	1,700	875	395
Italy	1,012	842	580
Portugal	6,520	5,425	1,350
Greece	5,400	3,575	1,655
Turkey	26,500	18,850	5,100
	(Jan. 1, 1940)	(July 1, 1951)	
United States	220	100	82

(Turn to page 104, please)



EATON

Fresh-Air Heating, Ventilating, and
De-Frosting Systems Achieve a New High in
Motor Car and Truck-Cab Comfort,
Safety, and Driver Health



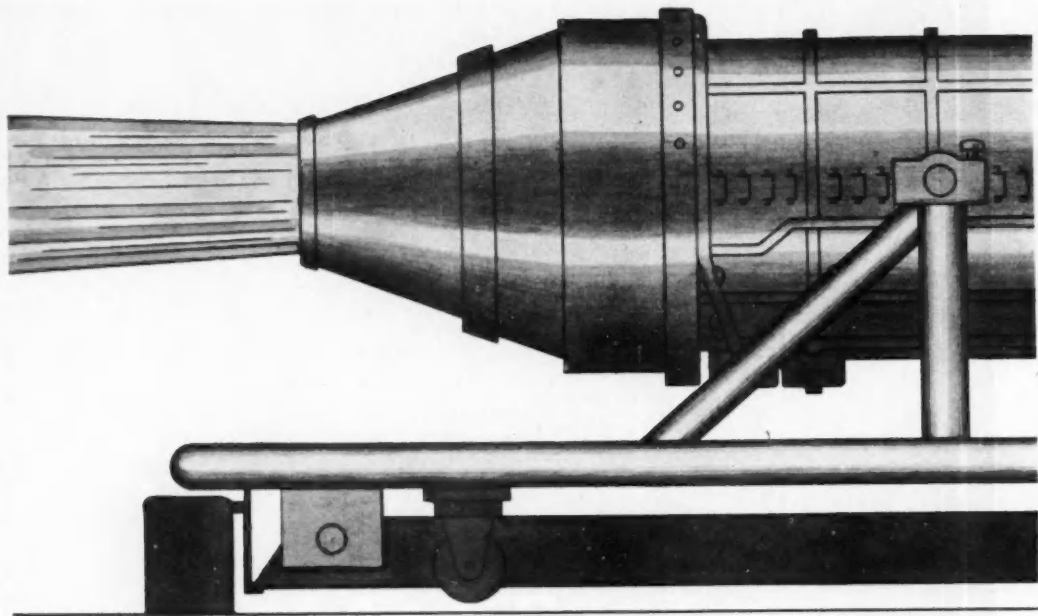
Manufactured in the country's largest, most modern plant devoted
exclusively to automobile heater production. Engineered for,
and sold exclusively to car and truck manufacturers.

EATON MANUFACTURING COMPANY

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EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR
PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES
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New Applications of the
SR-4® LOAD CELL
 Bring Higher Precision in

JET THRUST
 with the

**BALDWIN
 THRUST STAND**

The thousands of pounds of thrust needed to project a jet plane through sonic barriers can now be measured with highest accuracy and exact reproducibility on the new Baldwin Jet Engine Test Stand at Wright Aeronautical Corporation.

Basic design was worked out in close cooperation

with Wright Aeronautical Corporation to eliminate hazards and inaccuracies.

No pit or ramp is required. This makes it unnecessary to install costly air and water scavenging systems to remove combustible vapors. It also eliminates the use of lift trucks in the test cell.

The engine is easily moved and positioned. The engine dolly is wheeled over the thrust stand. Base structure guides it into position.

The mounting imposes no questionable restraint on the weighing system. Air-actuated tapered retractable pins engage with tapered bores, lifting dolly wheels from the floor, and firmly integrating dolly and thrust table.

Safety interlocks prevent accidents. Fuel cannot be supplied until retractable pins are fully engaged.

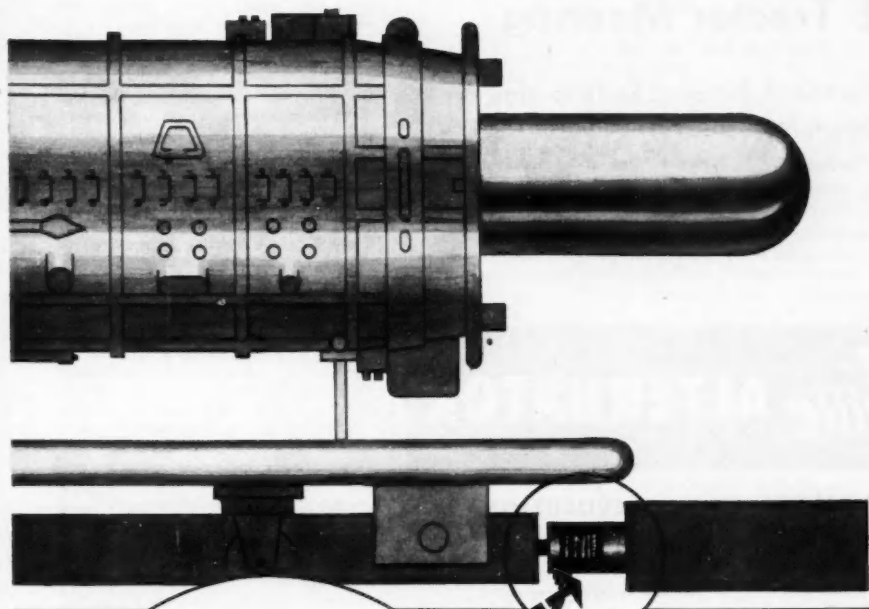
Maximum accessibility is preserved. Access is limited only by the dolly structure itself.

Top precision in measurement is attained. The Baldwin SR-4® Load Cell accurately transmits forces to the remote indicating instrument. Frictional and other unmeasurable losses are greatly reduced. The restraint exercised by the four stay-plates can be calibrated out of the indicating instrument.



TESTING
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Eddystone Division, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.



BALDWIN SR-4® LOAD CELL

The Heart of the Weighing System

The Baldwin Type "U-1" SR-4® Load Cell is a sensitive, accurate device that translates changes in weight into proportional changes in electrical energy. Ruggedly constructed, hermetically sealed, and with no moving parts, it employs the well-known SR-4® strain gage as a pickup. The gage is mounted on a rectangular steel column. Deformation of this column under load is accurately calibrated.

External circuits are entirely electrical. Recording, indicating or monitoring instruments and controls can be located at any remote point. This is but one of dozens of current applications for this load cell... and its possibilities have not yet been explored.



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Baldwin currently offers the most complete line of testing equipment available. This line is constantly expanded to meet new needs. In addition, Baldwin is always ready to work with you in developing special equipment to solve special problems. Your inquiries are welcome.

SAE Tractor Meeting

(Continued from page 100)

Modification of Standard Earthmoving Equipment for Military Requirements

By John A. Caldwell

Chief, Mechanical Equipment Branch
Fort Belvoir, Va.

MAJOR reason for modifying standard earthmoving equipment is to meet special military tactical require-

ments. One such modification is the radio suppression of all motorized items. The standards are spelled out in individual specifications and are necessary for two main reasons; one, to prevent interference with our own radio and radar equipment; the other, to

keep the enemy from locating our equipment by radio detection.

Better lighting equipment than that provided by commercial practice is required as a result of extensive tests by the Engineer Research and Development Laboratories. These tests proved that almost the same efficiency can be obtained in night work operations as in daylight if adequate lighting is provided. Military operations have stringent schedules which must be met and which require round-the-clock operation. Efficient lighting is required to provide the operator with good vision forward, on the ends of his cutting blade, and to the rear when backing up.

The ever-increasing popularity of air transport in military operations dictates that earthmoving equipment be capable of being air transportable. While some of it may be disassembled for this purpose, it is highly desirable that each piece be transportable as a unit to save both time and manpower since airborne operations are more urgent and have to meet more critical schedules than other operations.

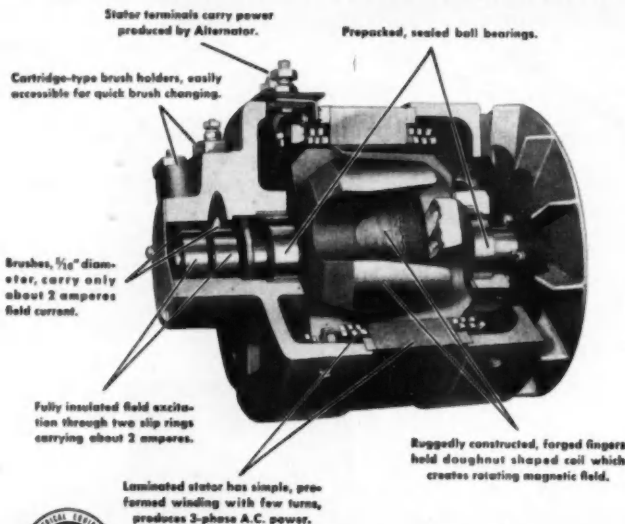
Generally speaking military airborne operations are to seize and hold land either in enemy territory or in locations inaccessible to land or water transport, and are conducted in phases. A typical engineer airborne operation is the building of an airstrip in enemy territory. In such an operation relatively light aircraft must be used in the initial phases because of the limited landing facilities and areas. Therefore, lightweight, highly-productive earthmoving equipment which can be put into use within a matter of a few minutes after it is landed must be utilized. This equipment paves the way for progressively larger items which are flown in during the later phases as more adequate landing facilities are provided and more time is available to prepare them for use.

A modification dictated by tactical requirements is to provide armor protection for the operator and engine on tractors and motorized graders. This armor is needed for protection against rifle and light arms fire which are frequently encountered behind the front lines. Sniper fire by the Japanese in early World War II accounted for a high per cent of casualties among our tractor operators which required quick development and provision of the cabs for field installation. We are now developing new cabs for the later model tractors to provide better protection and comfort for the operator and, also, protection for the engine which was not afforded in the old armor kits.

Landing operations require equipment which not only can be loaded easily into the narrow landing vessels, but also is water-proofed so that it can run through reasonably deep water without stalling in situations where the landing craft cannot reach the shore. Tractors must be modified for working on the beaches during landing opera-

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3M strippable coatings are designed for the protection of finished metal surfaces against mars and abrasion during fabrication. These vinyl coatings form a tough, abrasion-resistant film which protects metal thoroughly.

The coatings can be applied to blank or coil stock—before fabrication or between any stage of production—and greatly facilitate the handling of metal from manufacturer to fabricator to consumer. Your metal ends up smooth and unscratched . . . requires no *expensive repolishing!*

These low-cost, fast-drying coatings are easy to work with too. They can be applied at room temperature, using standard paint spray equipment . . . and can be stripped off or blown off when protection is no longer necessary. Strippable coatings also give you an important means of reducing "rejects."

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USES: protects metal from scratches, mars, abrasion in various stages of storage, shipping and fabrication; protects ground, polished or plated components against abrasion and tarnishing while other parts of sub-assembly are machined; also used to protect glass or other non-porous surfaces which easily scratch or abrade.

PROPERTIES: a red-brown translucent film, easily sprayed on, easily stripped off by hand or with an air hose; synthetic resin base; solvent type: excellent resistance to water, gasoline, oil; protects metal stock during stamping, deep drawing or forming operation; coverage for one mil film is 200 to 225 square feet per gallon.

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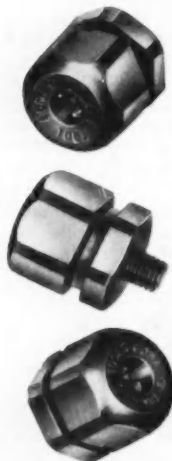


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A small chuck—just 13/16" O.D.—designed to do a big job, especially when tool space is limited. Low in first cost, lower still in maintenance—jaws are easily replaced in one minute without using any tools. Rolling action of cone jaws as chuck is tightened presents a new face to tool shank each time, reducing jaw wear, and pulls shank firmly into recess in chuck, insuring true alignment. For use with all Buckeye 30°, 90°, 360° adjustable, angle head tools—easily adapted to other makes. Thousands of Buckeye Cone-Jaw Chucks are saving time and money in hundreds of plants today—how about yours?

Buckeye Tools
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Portable Air
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tions to serve as pushers, cargo handlers, dozers, etc.

Further along tactical lines, atomic warfare also presents its problems. Equipment for digging personnel trenches rapidly for hospital and other personnel who are not able to dig their own is under development. High speed tunnelling machines for underground construction work and equipment for clearing passages through radioactive areas are indicated. All of these are items for which modified commercial units may provide solutions.

Coal Burning Gas Turbine

(Continued from page 47)

has a high-pressure casing which would enable direct firing to be tried if the atmospheric system should be at a later date be replaced by a pressurized system.

Pulverized coal is carried from the mill through two discharge pipes by air supplied by a 3000 cfm blower, driven by a 30 hp induction motor. Air flow can be regulated by dampers. A recirculating air system is used in which the air, after the coal has been stripped out by the collectors, is returned to the blower intake. The collector consists of four Type 10 VSX Multiclones which discharge into a small storage tank. Coal delivery to the storage tank is controlled by a level indicator which operates a relay in series with the pulverizer level controller.

The Allis-Chalmers locomotive-type gas turbine power plant is being installed within locomotive cab contour limitations. Temporary duct work is being installed to lead outdoor air from above the building roof through a flow nozzle to the compressor intake. Exhaust will be discharged through the roof.

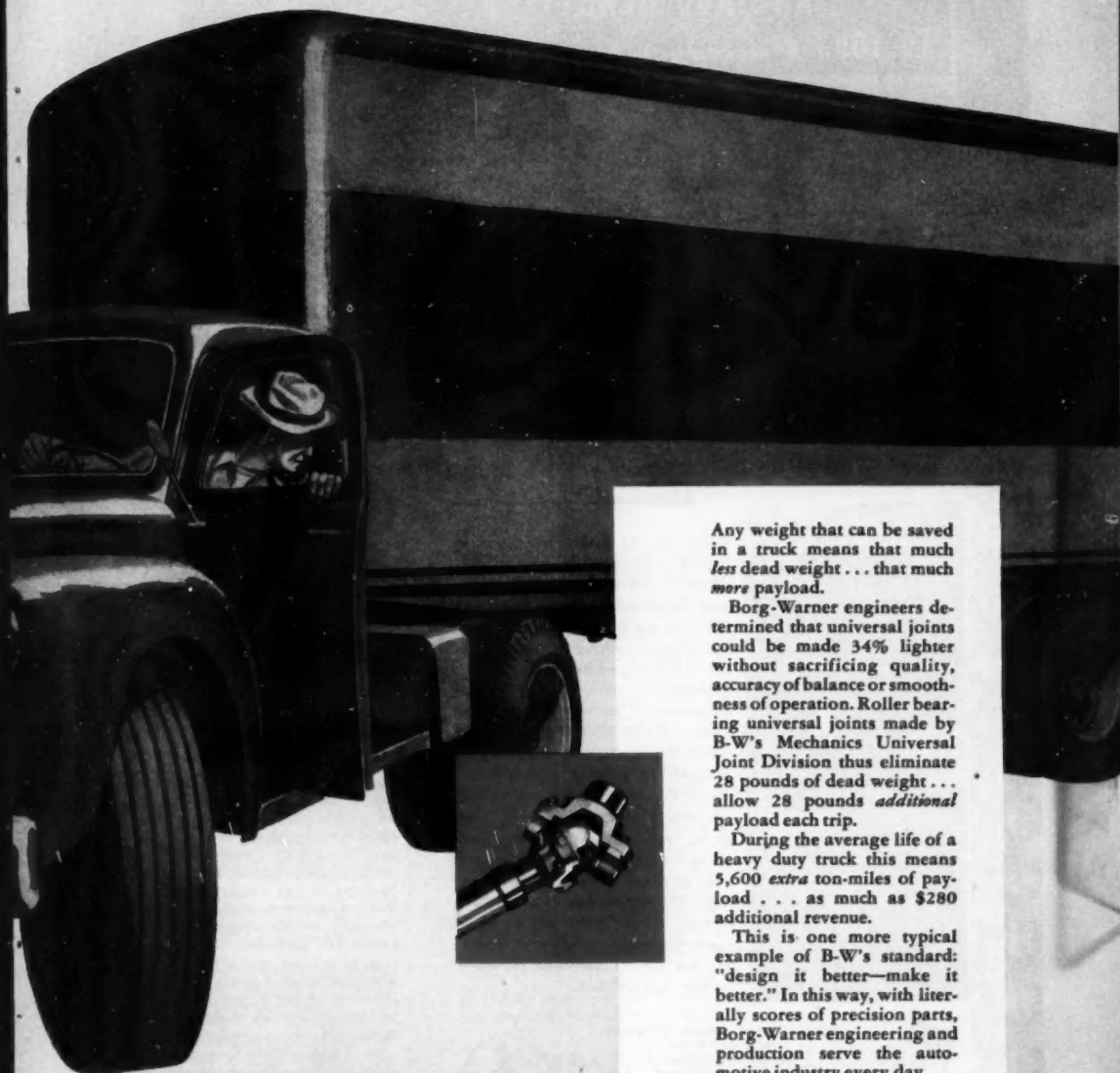
Four General Electric Co. air-blown, variable-resistance grids have been installed to absorb the power produced by the traction generators. The plant may be operated either manually or automatically from the control station, where all of the necessary instruments, valves, etc., are located.

The combustion and ash removal system is similar to that developed for the Houdry turbine. Twin combustors are used, because the height limitation precluded the use of a single large combustor. A louver and a blowdown separator are installed at the end of each combustor. Type 347 stainless steel and Inconel are used for these components.

From the combustor outlet to the turbine inlet, the entire system is subjected to the full turbine temperature of 1300 F. After carefully considering

5,600 FREE TON-MILES OF PAYLOAD

... thanks to **BORG-WARNER** engineering



Any weight that can be saved in a truck means that much less dead weight... that much more payload.

Borg-Warner engineers determined that universal joints could be made 34% lighter without sacrificing quality, accuracy of balance or smoothness of operation. Roller bearing universal joints made by B-W's Mechanics Universal Joint Division thus eliminate 28 pounds of dead weight... allow 28 pounds additional payload each trip.

During the average life of a heavy duty truck this means 5,600 extra ton-miles of payload... as much as \$280 additional revenue.

This is one more typical example of B-W's standard: "design it better—make it better." In this way, with literally scores of precision parts, Borg-Warner engineering and production serve the automotive industry every day.

B-W ENGINEERING MAKES IT WORK—

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Almost every American benefits every day from the 185 products made by

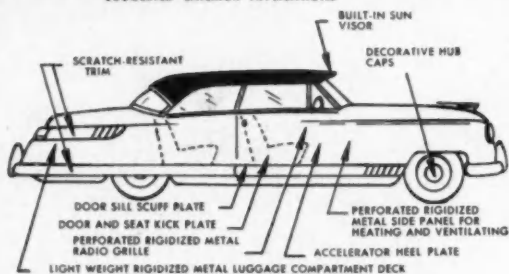
BORG-WARNER



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How to CONSERVE METAL AND ADD BEAUTY TO YOUR *Passenger Car Design:*

SUGGESTED EXTERIOR APPLICATIONS



SUGGESTED INTERIOR APPLICATIONS

ACTUAL PHOTOGRAPHS OF
RIGIDIZED METAL USED IN
AUTOMOTIVE APPLICATIONS



Conservation of metal in car design, as well as in nearly every other product design, is essential today. One of the ways through which conservation is possible is to use three-dimensional design-strengthened, textured RIGIDIZED METALS. Increased flexural rigidity permits gage reductions, resulting in metal conservation. Scratch-resistant, dent-resistant RIGIDIZED METAL is ideal for automotive applications where rugged resistance to constant scuffing is essential. This versatile metal may be used for interior and exterior trim, scuff plates, sun visors, accelerator heel plates, luggage compartment lining and many other automotive parts. Perforated RIGIDIZED METAL may be used to advantage on radio grilles and air-conditioning side panels. Wherever it is used, you are assured continued protection for that "new car" look.

WRITE on your company letterhead
for a copy of the
RIGIDIZED METALS
CONSERVATION HANDBOOK today



Rigidized Metals Corporation



67110 OHIO STREET — BUFFALO 3, NEW YORK
Offices in Principal Cities in the U. S. A. and Canada

all available materials, it was decided that the tees, elbows, and the separator shell should be made of Inconel X. This alloy maintains excellent tensile strength up to 1400 F, thus providing a margin of safety and making internal insulation unnecessary. Experience has shown that, with proper heat treatment, Inconel X can be machined and welded satisfactorily.

Separator tubes are of the Dunlab design. Thirty-six tubes were originally installed, but 10 will be blanked off to raise the air flow to 1500 cfm per tube. Type 347 stainless steel was used in constructing the internals of the separator.

The paper "Progress Report on the Coal Burning Gas Turbine," of which the foregoing article is an extract, was presented at the recent Midwest Power Conference held in Chicago, Ill.

Automotive and Aircraft Sealers

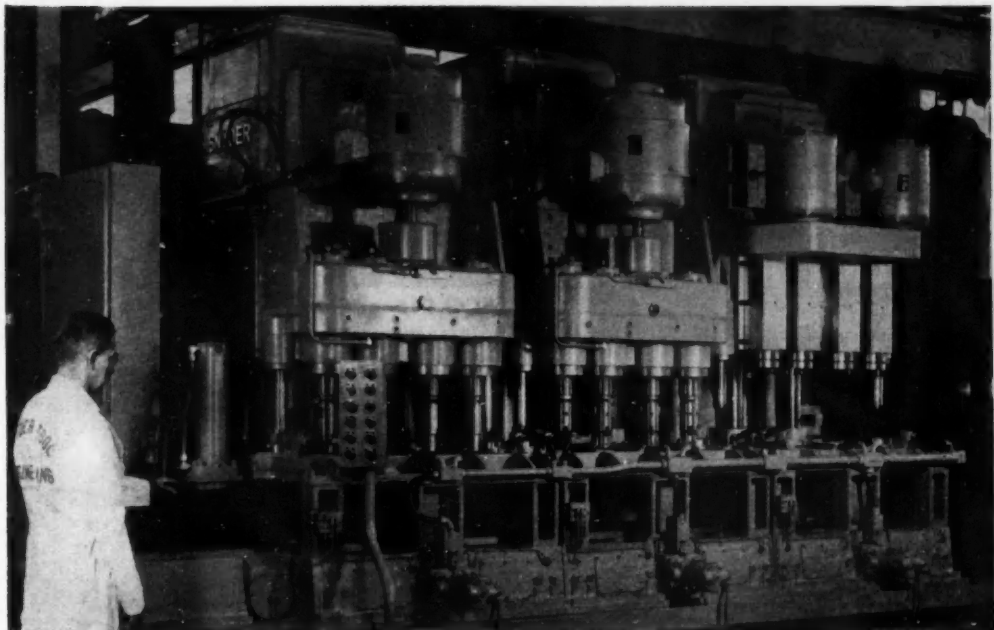
(Continued from page 43)

automobile body itself, special sealers are used to seal the glazing into rubber channels. One typical material is essentially clear and colorless, and is based upon a synthetic resin.

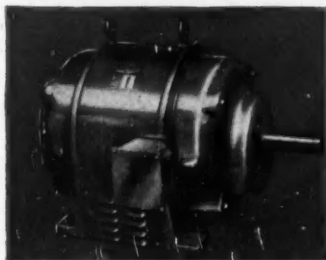
Truck bodies may create special problems for sealers. One use is in refrigerator trucks, where all body seams are sealed to prevent entrance of warm air. Aluminum skin and other aluminum members in truck bodies brings up the problem of isolating it from contact with steel members to prevent galvanic action. Application of a mastic sealer of the zinc chromate type at points where steel fasteners, steel moldings, or other steel members are applied has been found effective in eliminating destructive action. Another problem in the construction of trucks and trailers with aluminum skin is the tendency of the aluminum to gap between the fasteners. A sealer is now used to prevent opening at these seams. When plywood or pressed board is used for truck or trailer bodies, a sealer may be used to exclude weather, dust, and fumes.

In the aircraft industry sealants must meet much more exacting requirements. The sealing of the structure of the cabin to permit pressurizing during high-altitude flight has already been mentioned. Sealers used for this and many other aircraft applications have been of several synthetic rubber bases such as Buna N compounds or Thiokol putties, but more recently high-solids catalytically-cured Thiokol sealants have been used. A second large-scale

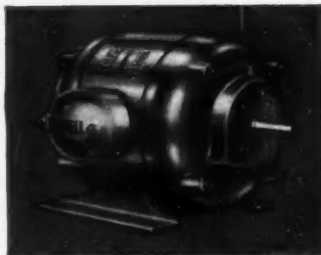
(Turn to page 112, please)



Three jobs done, instead of one!



Howell Type F Motor. A high slip, high torque motor designed for punching and boring operations. Sizes $\frac{1}{2}$ to 200 H.P. in open frames; $\frac{1}{2}$ to 125 H.P. in enclosed frames.



Howell Type SC, general purpose, protected-type Motor. Ideal for driving machines and equipment where atmosphere is moisture- or dust-free. Horizontal or vertical mounting.

This 7 station transfer-type boring machine was designed and built to replace *three* machines!

It rough bores, semi-finish bores and finish bores cylinder sleeves to exacting tolerances in one continuous, automatic operation.

Howell engineers worked closely with this manufacturer to provide the right type and size motor for each application. Two 15 H.P. and two 5 H.P. Howell Industrial Motors supply dependable power for the twelve boring spindles. A $7\frac{1}{2}$ H.P. Howell motor operates each of the three hydraulic pumps which control the rough, semi-finish and finish heads. Each motor was engineered for its job!

This is a typical example of the service Howell offers you. We will work with you, both in your plant and at Howell, to design precision-built, quality motors for your jobs.

Our research facilities, engineering experience and manufacturing skill are at your service. May we help you?

HOWELL ELECTRIC MOTORS COMPANY

Howell, Michigan



HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built industrial motors since 1915

INCREASE YOUR PRODUCTION WITH THESE NEW SUNDSTRAND AUTOMATIC LATHES



110 Pieces Per Hour

... are obtained on this Sundstrand Model 4A Automatic Lathe. Operations include turning, facing and forming.

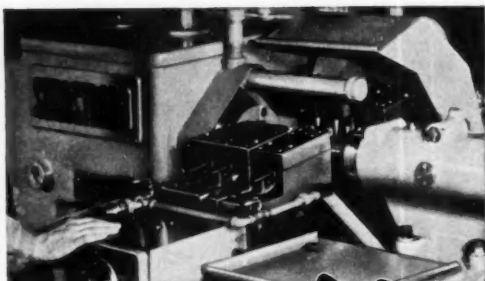
These are only four of the 8000 or more users of Sundstrand Automatic Lathes. These users have always found Sundstrands a profitable investment and many have changed from old to new Sundstrand Automatic Lathes in order to get even higher productivity as a result of design improvements. The following features incorporated in the design of the latest models of Sundstrand Automatic Lathes will help you increase production.

Get Greater Horsepower

All new Sundstrand Automatic Lathes have been re-designed for greater rigidity and larger spindle drive motors. They have ample power for use of carbide cutting tools and are capable of doing more work. Note the massive headstock design in the machines illustrated.

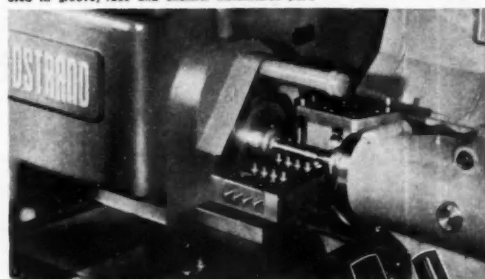
Get a Wider Feed Range

A wider feed range has been provided to enable the handling of a



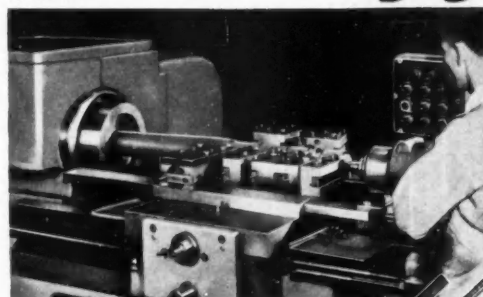
100 Pieces Per Hour

... is the production rate of this new Sundstrand Model 8A Automatic Lathe. Twenty-two carbide tools are used to groove, face and chamfer transmission part.



Production Increased 70%

... on this Sundstrand Model 12A Automatic Lathe. Illustrated is one of 12 different jobs run over two Model 12A Lathes.



Production Increased 300%

... with this Sundstrand Model 16 Automatic Lathe. Production is over 5 per hour compared to 1-3/4 by the former method.

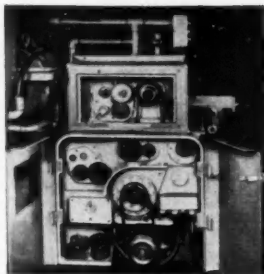
greater range of parts and materials at maximum cutting efficiency. The New Models 4A, 8A, and 12A have a ratio of 18 to 1 between high and low feeds — Model 16 has an even greater range.

Get Greater Carriage Adjustment

Both front and rear carriage of the latest Sundstrand Automatic Lathes are adjustable full length between headstock and tailstock centers — another important new feature.



RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



Get Faster Set-Up

The photo at the left is an end view of machine showing convenient location of pick-off gears for changing spindle speeds and front and rear carriage feeds. The feed and speed chart and pick-off gear storage compartment are readily accessible for quick set-up or changeover.

Get a Wider Speed Range

Spindle speed range ratios have been increased to 30 to 1 on all new Model Sundstrand Automatic Lathes to obtain maximum in cutting efficiency over a wider range of sizes of parts and material. The spindle unit is equipped with two driving gear centers, which increase the range between high and low spindle speeds. In addition, four speed changes can be obtained from one set of gears instead of the usual two.

Get Automatic Lubrication

To insure long machine life and lower maintenance costs, all moving parts within the machine such as spindle bearings, gears, carriage and cross slide ways are provided with automatic lubrication.



Get Quick Cycle Change-Over

Complete control of all cycles is provided by adjustment of dogs on a disk. Making cams is eliminated. Changing position of dogs on disk changes length of rapid approach, feed and rapid return strokes — enables operator to set up

cycle quickly and change over from one job to another easily.

Get Automatic DeClutching

All new Sundstrand models have been provided with automatic declutching between spindle and spindle motor with self-adjusting magnetic clutch and brake for quick stopping of spindle rotation.

Get Screw Feed to Front Carriage

All new Sundstrand Automatic Lathes have screw instead of rack feed to the front carriage — resulting in fine finish and long tool life.

Get Hardened and Ground Steel Carriage Ways

All new Model Sundstrand Automatic Lathes have hardened and ground carriage and cross slide ways.

4 Models Cover HP Range of 3 to 75 HP

	MODEL 4A	MODEL 8A	MODEL 12A	MODEL 16
SPINDLE MOTOR	3 to 10 HP	10 to 25 HP	20 to 50 HP	50 to 75 HP
SPEED RANGE (Type A) (Type B)	60 to 1800 RPM 120 to 3600 RPM	40 to 1200 RPM 80 to 2400 RPM	30 to 900 RPM 60 to 1800 RPM	15 to 750 RPM
FEED RANGE	.003 to .048 IPR	.004 to .070 IPR	.004 to .070 IPR	.0025 to .100 IPR
FRONT CARRIAGE: Longitudinal feed with angular feed-in, max. Swing over cross slide, max. Rapid traverse rate	5" 8 3/4" 275"	6" 12 1/2" 250"	8" 15 1/4" 250"	12" 17" 250"
REAR SLIDE: Max. Stroke	4"	5 1/2"	6 1/2"	8"
LENGTH BETWEEN CENTERS	15, 24 & 36"	24, 36, 48 & 60"	24, 36, 48 & 60"	36, 60 & 84"

FREE ADDITIONAL DATA

The complete new line of Sundstrand Automatic Lathes includes the Models 4A, 8A, 12A and 16 and they range from 3 to 75 HP. Write for complete information on these new machines today. Ask for bulletin 212



SUNDSTRAND Machine Tool Company

2571 Eleventh St., Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES



NEW AIRCRAFT DUCT

FLEXFLYTE*

To heat the cool spots... to cool the hot spots... to ventilate any spot, you need Flexflyte.

A DUCT... specially designed for Aircraft

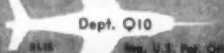
- 1... Minimum Weight
- 2... Maximum Flexibility
- 3... Minus 65F—600F Range
- 4... High Plus and Minus Pressure
- 5... Petroleum Resistance
- 6... Minimum Bend Reduction
- 7... Flame Resistant
- 8... Optimum Airflow

Standard Constructions
IMMEDIATELY AVAILABLE

Ducts for special problems
... special shapes ...

ENGINEERED FOR AIR

Write... Wire... Telephone
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GUILFORD, CONNECTICUT, U.S.A.

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Office: { Pasadena 1, California

Automotive and Aircraft Sealers

(Continued from page 108)

use with even more exacting service requirements is the sealing of the wing interior to make it serve as a fuel tank. Many types of sealants have been used, but LP-2 Thiokol compounds catalytically cured, are currently favored by established aircraft companies. They are used to bridge voids, seams and faying surfaces or between adjacent layers of structure. In some cases bolts and rivets also are sealed. The sealants are applied by brushing, knifing, or pressure extruding. A catalyst is added just before applying to speed the set or cure of the sealer. The sealers retain flexibility and adhesion at temperatures as low as -100 F, and are suitable for use to about 180 F, with chemical resistance to the aromatic elements in aircraft fuels at all usable temperatures. This type of integral fuel tank sealant employs a Buna N-phenolic synthetic rubber or similar type of protective coating for increased aromatic fuel and water resistance, and to minimize damage from abrasion and corrosion.

Another type of material is used as a coating over electrical terminals of the engine ignition system to prevent corona discharge at high altitudes. Synthetic rubber putties are used for sealing voids. Special quick-curing formulations are used for maintenance work. Other common aircraft applications for sealants are Buna N high-temperature compounds for hot air duct sealing, zinc chromate and mastic felt and rubber tapes for cold air ducts, and protection of cargo and passengers against liquid spillage. Extremely high temperature and fire-resistant sealants are used for engine compartments, firewall, and nacelle areas to prevent passage of gases, liquids, and flame.

Sealers of all types are capable of considerable variation in properties by changing the proportion of base material to solvent or vehicle; by adding filler, pigment, or other inert material, or by adding catalysts or other modifying agents to the formulation. The base materials of automotive sealers—natural asphalts, bitumens, or oil tar, or natural or synthetic rubber—may be dissolved or dispersed in gasoline, a ketone or ester solvent, water, or an oil. Chopped asbestos, chopped cotton, white lead, or whiting are some of the most common fillers. Some of the properties of the important base types are as follows:

Asphaltic—Color limited to black. Good outdoor durability, low cost, rapid application, readily soluble in petroleum or other organic solvents. Softens at slightly elevated temperatures.

(Turn to page 114, please)

Don't scrap parts BECAUSE OF BROKEN TAPS • DRILLS STUDS • MACHINING ERRORS

Parts costing as little as 25c can be salvaged economically by an ELOX ELECTRON DRILL*.

WHAT IS ELECTRON DRILLING? Simply, Electron Drilling is accomplished by a vibrating, non-rotating electrode that cuts through any metal of any hardness—magnesium to diamond-hard steel—by minute disintegration of the metal. This is done without annealing or hardening the work-piece, without sticking or welding.

Complete price range of ELOX ELECTRON DRILLS* from \$150 to \$3450 of automatic or hand fed units.



Several Elox Demonstrator Trucks are touring the country continuously... write us to arrange a demonstration in YOUR plant on YOUR work. There's no charge for this service.

ELOX ELECTRON DRILLS* are now being used by the largest automotive firms, heavy and light manufacturing firms and divisions of the U. S. Army and Navy. *T.M. Reg.

WRITE FOR
COMPLETE DETAILS
AND LIST OF USERS

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742 N. Rochester Rd., Clawson, Mich.

GITS Unit^{*} SEAL *Now* **STANDARDIZED**



For . . .

Gear Reduction Units
Aircraft Reciprocating Engines
Automotive Accessories
Jet Propulsion Units
Washing Machines
Standard & Special Machine Tools
Electrical Power Equipment
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*Cartridge Seal . . . pressure balanced . . . requiring only 25% more space than lip-type seals.

If you have a shaft sealing problem, Gits experience in these and many other specific applications can prove of great and immediate value to you.

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GITS BROS. MFG. CO.

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Gits Lubricating Devices,
The Standard For Industry For Over 40 Years



WITTEK

NOC-OUT HOSE CLAMPS

*The Standard
of the Automotive
Industry*



Type A—Radiator
Hose Connections



Type HP—High
Pressure Hose
Connections



Type G-88—Booster
Brake Hose Connections
No. G-8-HH
for Hot Water
Heater Hose

Wittek Noc-Out Hose Clamps are designed in a variety of types made in many sizes for use by the automotive industry. Because they provide the most practical leakproof hose connection, they are specified by the leading manufacturers as standard, original equipment for automobiles, buses, trucks and tractors.

Write for descriptive literature.

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HOSE CLAMPS

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MANUFACTURING CO.

4319 W. 24th Place, Chicago 23, Ill.

*Dependability in Hose Clamps
for Over a Quarter of a Century*

Sealers

(Continued from page 112)

Rubber—Used for automotive sealers. Wide range of colors possible. Good flexibility, good adhesion to impervious surfaces, excellent water resistance. Material may be a blend of several types of rubber, or may be made from reclaimed rubber, and properties may be varied to suit needs.

Natural rubber—Poor resistance to oil and petroleum fuels, and to ozone, sunlight and weather.

Butadiene-styrene synthetic rubbers (Buna-S, GR-S) and **butyl synthetic rubbers**—Not oil-resistant, but superior to natural rubber in resistance to sunlight. Butyls can be highly acid resistant.

Acrylonitrile Buna N types—Compounded to resist oils, resist aromatic fuels fairly well, are especially good at high temperatures.

Choloprene synthetic rubbers—Resistant to petroleum oils, but less resistant to aromatic compounds.

Thiokol or polysulfide polymer type rubbers—Highly resistant to all solvents except chlorinated hydrocarbons, acids and alkalis. Have excellent resistance to moisture and weather, but limited resistance to temperatures above 200 F.

Bulk can be increased by addition of filler, with some sacrifice of flexibility. Control of solids content is frequently necessary to adapt the material to method of application; a thick paste may be knifed into place, but a thinner consistency is necessary for extruding from a caulking gun. By addition of a catalyst to many types of rubber compositions the sealer may be made to cure quickly without excessive shrinkage so that sealant can be placed between assemblies and immediately closed up. This eliminates the delay for evaporation of solvent or the necessity to cure immediately.

PUBLICATIONS

(Continued from page 62)

D-110 Metal Fabricating

Geuder, Paeschke & Frey Co.—“Facilities Available for Military Production” is the title of a 12-page brochure issued by the company.

D-111 Shell Casting

Borden Co.—“What You Should Know About the New Shell-Molding Process” is the title of an eight-page booklet which has just been brought out.

D-112 Expansion Joints

Solar Aircraft Co.—A catalog containing over 78,000 possible combinations of bellows type expansion joints has recently been published.

At Hotel Cleveland

you'll enjoy
friendly, attentive service...
delicious food...
quiet, sleep-inviting rooms...
a sincere and hearty welcome.



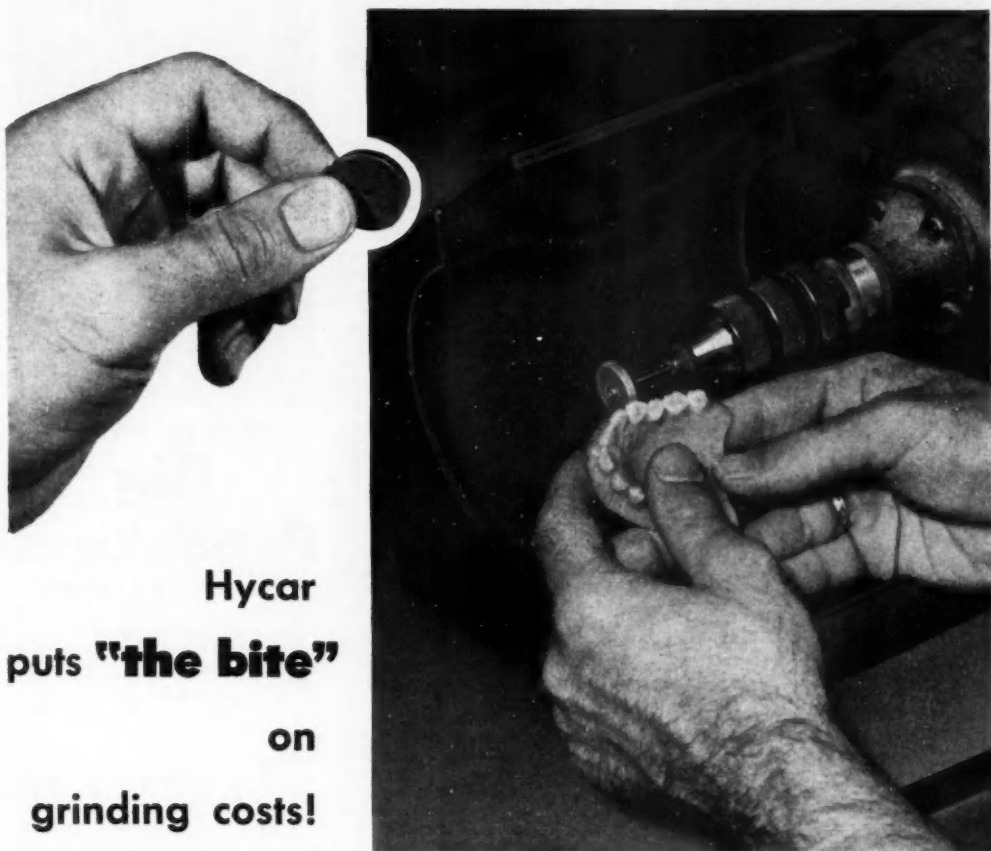
You'll be only a step
(through covered passage)
to Union Terminal trains
and garage, and convenient
to anywhere you'll want
to go in Cleveland.



All rooms with radio—many
with television.

Hotel Cleveland
CLEVELAND, OHIO

**Another new development using
B. F. Goodrich Chemical Company raw materials**



**Hycar
puts "the bite"
on
grinding costs!**

Data courtesy of Austenal Laboratories, Inc., Chicago, Ill.

THIS unusual use for Hycar rubber may give you an idea—may show how Hycar can cut costs for you where fine grinding operations are involved.

The picture shows Hycar being used in the manufacture of dental restorations. The cast metal is first given a rough grind using a stone abrasive wheel. However, this operation leaves scratches on the metal surface. To remove these scratches, a Hycar bonded wheel is used.

It runs at speeds from 20,000 to 25,000 r.p.m. Naturally, there is a high heat build-up, and extreme wear and tear on the Hycar wheel.

But because of Hycar's outstanding resistance to heat and abrasion, the wheel has a far longer life than types formerly used. Less dust is produced with the Hycar wheel. And, Hycar's uniformity simplifies wheel manufacturing operations, assures constant top quality.

Hycar's many advantages make it ideal for improving and developing products for many uses. Hycar rubber compounds resist heat and cold, abrasion, gas and oil, many chemicals, and more damaging factors. Demand for Hycar exceeds supply, but limited quantities available for development work. For help-

ful technical advice, please write Department HD-10, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

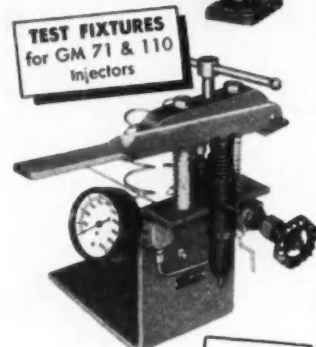
B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Need high elasticity? Hycar has it—plus extreme temperature resistance and more advantages.

Hycar
Reg. U. S. Pat. Off.
American Rubber

GEON polyvinyl materials • NYCAR American rubber • GOOD-RITE chemicals and plasticizers
HARMON organic colors

Essential DIESEL TUNING TOOLS



Other Diesel Service Equipment:

- EXHAUST GAS METERS
- NOZZLE CLEANING KITS
- VALVE LAPPING BLOCKS

RACHARACH INDUSTRIAL INSTRUMENT COMPANY
7000 Bennett Street, Pittsburgh 8, Pa.

Send complete information on your
Specialized Diesel Tuning Tools

Name.....

Company.....

Address.....

Flying Boat

(Continued from page 41)

board unit on each wing is the single type, this giving a total of 10 engines, each of 3500 hp. As it is still in the development stage, much information regarding the Proteus is withheld, although one of these engines was exhibited at the recent Paris show.

All the accessory drives are taken from the coupled units, which drive counter-rotating propellers through a gearbox, the first reduction to the main output gear being 3.21 to 1, and the second reduction to the two coaxial output shafts being 3.70 to 1. Clutches are provided to disconnect either engine in the event of failure, and the main drive shaft is fitted with a brake assembly to prevent rotation when the ship is stationary. The whole power plant is arranged for rapid removal as a unit, to assure minimum delay when overhauling.

The propellers are built under license by De Havilland and are four-bladed type of 16 ft, six in. diameter. They incorporate hydraulic pitch locking, integral translation unit lubrication and electrical blade deicing, in addition to quick feathering and reversible pitch. The two propeller units are connected to a single totally-enclosed pitch change mechanism by extended racks which transmit movement of the hydraulically controlled piston to the front and rear propellers simultaneously. The translation unit, placed between the two propellers, relays the rack movement from front to rear propeller. The low level of vibration which is a feature of the gas turbine engine makes possible a very light propeller which, with the use of a laminar flow blade section, gives exceptionally high efficiency. The high power-to-weight ratios of these propellers are attributed largely to the electronic methods of vibration investigation developed during the last few years. The counter-rotation principle allows of a smaller diameter than would be possible with a single rotation propeller of equivalent power absorption, thus permitting higher propeller cruising rpm and in a measure lessening the problem of engine reduction gear design. Each outer single engine drives a single propeller.

All controls are power-operated with full provision for duplication of units. In addition to exhaustive laboratory tests, air trials of this control system have been carried out in another flying boat.

Passenger and baggage accommodation is subject to modification. Provision can be made for up to 100 passengers, the actual number to be carried depending on the service to be operated. It is stated that the weight/power ratio is only nine lb per hp, and that this unusually low power loading

(Turn to page 120, please)



ONE OF SEVEN

Big Producers

AT KEY WEST, FLORIDA

Seven Layne Well Water Supply units, each testing around 8,000 gallons per minute, have been installed to furnish cooling water for a power project at Key West, Florida. Permanent installations will be Layne Vertical Turbine type Pumps, each having a capacity of 2,300 gallons per minute. Preliminary tests indicate that efficiency will be much higher than promised.

Layne's method of designing, building and installing well water supply units is fully proven in higher production and lower operation cost. All installations are by Layne's own field crews and the work, from start to finish, is under the constant supervision of Layne engineers. Thoroughly tested before final delivery, Layne wells and pumps provide the utmost in dependability and long life.

For further information, catalogs, bulletins etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

FOR CITIES, FACTORIES—

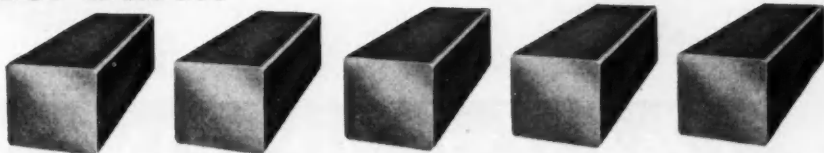
and plants of all kinds. Layne contracts for and builds complete well water supply systems of any size or capacity for cities, factories, ice plants, paper mills, pipe lines, petroleum refineries, air fields, chemical plants, packing plants, railroads, irrigation farming—or any situation where big quantities of well water must be obtained at extra low cost

Layne
WATER SUPPLY
WELLS & PUMPS

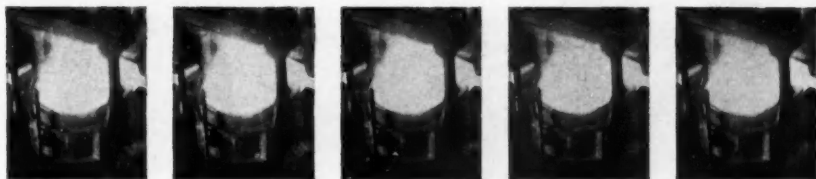
You get uniform forgings...



bar after bar...



heat after heat...



with **TIMKEN®** forging steels

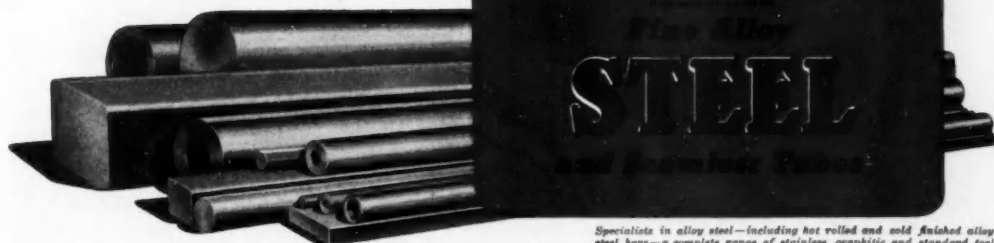
FROM bar to bar and heat to heat, Timken® forging steels give you uniform forgeability, plus superior surface and internal quality. Result: better forgings at lower cost.

Because Timken forging steels give you uniform chemical and physical properties, uniform response to heat treatment, and uniform machinability, rejects are reduced. You have fewer delays and shop practice changes. And

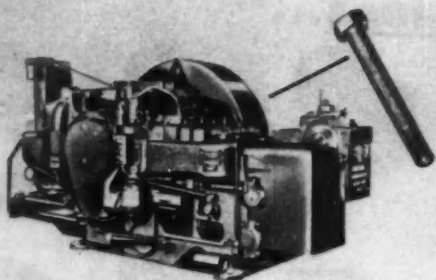
the performance of your forgings is consistently excellent.

You're certain of all these advantages because Timken forging steels are tailor-made to your specification, with quality carefully controlled at every step in production. For an on-the-job analysis of your forging problem, ask for the help of our Technical Staff. There's no obligation. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

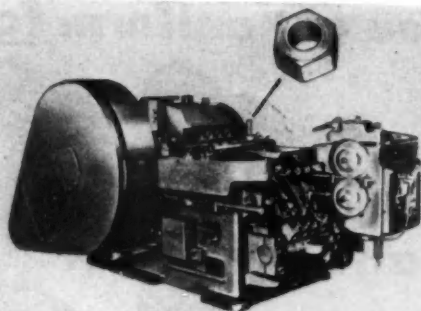
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphite and standard tool analyses—and alloy and stainless seamless steel tubing

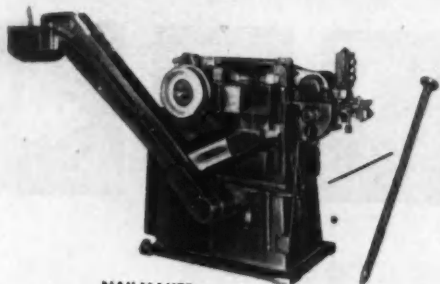


BOLTMAKER

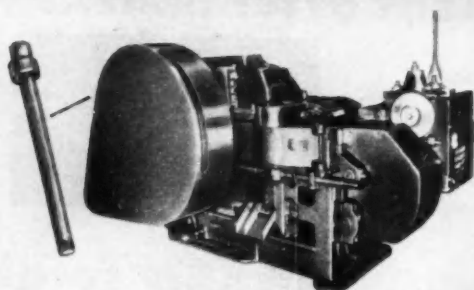


COLD NUT FORMER

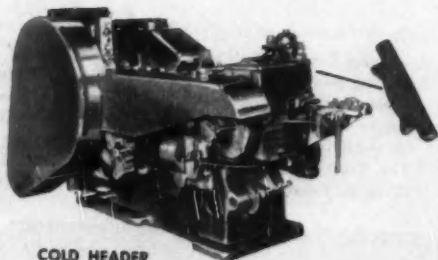
Our Job: HELPING YOU



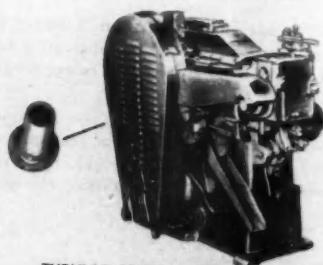
NAILMAKER



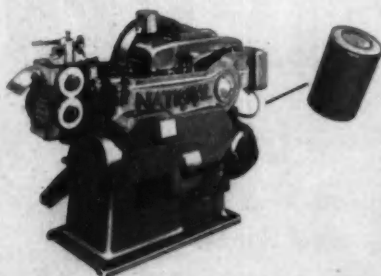
PROGRESSIVE HEADER



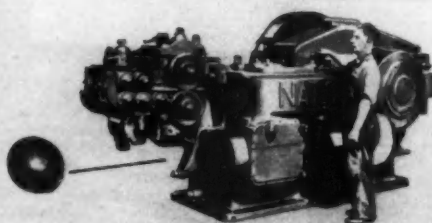
COLD HEADER



TUBULAR RIVET HEADER



ROLLER HEADER



BALL HEADER

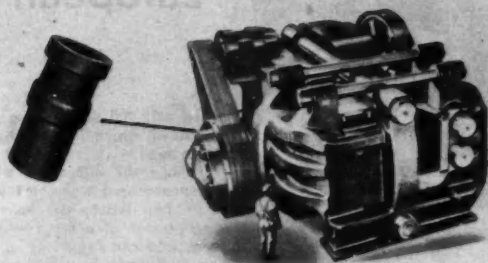
● Most people think of metal as an unyielding solid. To us it's fluid, even when cold. For 76 years our business has been the development of methods and machines which make metal *flow* by pressure into shapes required for the countless parts used in industry.

In peace and war, a growing share of the world's forgings, fasteners and other parts are being made on NATIONAL-built machines.

For example, large automobile crankshafts are finish-forged on a MAXIPRES weighing 1,600,000 pounds . . . five-penny nails stream from a NAILMAKER all day long 13 a second . . . ball-point pen balls, so small it takes 111,000 to make a pound, are made automatically from coiled wire on the smallest Cold Header.

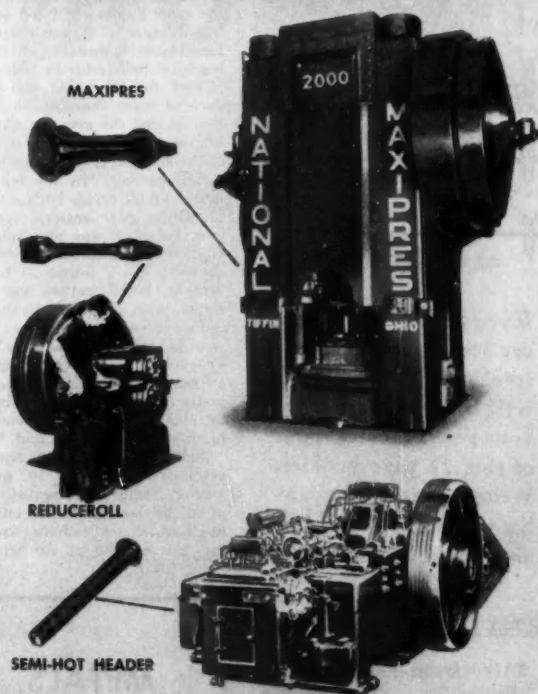
NATIONAL'S all-around experience covers the full range of forging—hot and cold, large and small, ferrous and non-ferrous.

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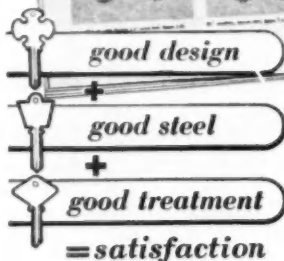
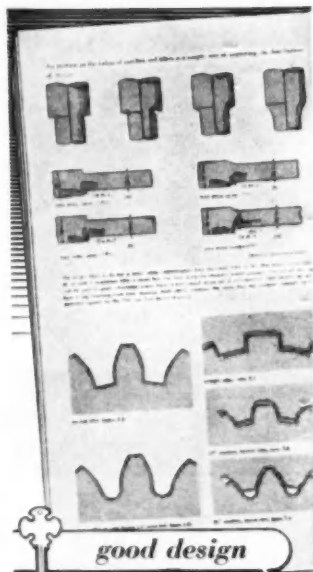
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European Machine Tool Show

(Continued from page 39)

which 270,000 square feet represented stands on which 2000 machines were in operation.

Among the difficulties which had to be encountered was the laying of concrete foundations for heavy machines and presses of a total weight of 8000 tons, and the supplying current totaling 5000 kva. In addition to the 1000 and 750 kva transformers in existence, one of 750 kva, seven of 200 kva, two of 500 kva, one of 400 kva and ten electric generating sets of 103 kva each had to be installed. Another difficulty was the installation of the machines, most of which came by rail. For this work four traveling cranes of 15 tons each had to be installed, also 15 cranes of 8 tons, six 10-ton electric cranes and the same number of 2-ton capacity.

A feature of this exhibition was the formidable comeback of the German machine tool industry, which occupied 173 of the total 852 stands, with an area of more than 72,033 square feet. France had the greatest number of exhibitors—459, but many of these were in the accessory, tool, electrical and material sections. In the main hall for lathes of all types, boring and drilling machines, gear cutters, etc., the German industry was particularly strong from the smallest sensitive drilling machine to heavy lathes 33 feet between centers. Italy's return was also sensational, with 28 stands in the main hall and seven in the class for automatic and semi-automatic lathes, mechanical and hydraulic presses, etc. Switzerland was strong with 71 exhibits, the great majority of these being precision machines by such firms as the Genevoise, Oerlikon, Hispano-Suiza and Swiss Tool.

Britain was quite inadequately represented with only 10 makes. The United States representation was out of all proportion to the importance of the machine tool industry in that country, the number of exhibits being 18.

Companies represented were Gleason, Sundstrand, National Broach and Machine, Hartford Special Machinery, New Britain-Gridley, Cone Automatic, Henry & Wright, DoAll, Kling Brothers, Bliss, Martin Wells, American Machine & Foundry, Bay State Abrasive, Latrobe Electric Steel, Physicists Research, Allen Bradley, and Kent Cliff Laboratories. Timken, as well as Bliss, was represented by the French factories.

This exhibition was general and not at all special to the automotive industries. Renault showed a transfer machine working on shock absorbers, which was in operation several hours each day. There were several examples of automobile manufacturers having devoted some of their activities to machine tools. Prominent from Italy was Fiat with gear cutters, radial drilling machines, milling machines, lathes and automatics.

Somua, one of the French truck manufacturers, is now devoting a lot of attention to machine tool construction and Imperia, one of the oldest of the Belgian car manufacturers, has discontinued automobiles for machine tools, notably tool grinders.

Flying Boat

(Continued from page 116)

in combination with the fine aerodynamics of the ship will insure exceptional all-round performance. The cruising speed will be approximately 380 mph at the operating height.

Each boat will emerge onto the apron complete except for final assembly of the outer wing sections, the top portion of the fin and the rudder. Tests will be carried out on Solent water, with the company's plant as a base.

METALS, the monthly market report by W. F. Boericke that normally would appear in this issue of **AUTOMOTIVE INDUSTRIES**, has been scheduled for the October 15 issue, which will feature editorial material keyed to the National Metal Congress and Exposition to be held October 15-19 in Detroit. The next **METALS** report will appear in the November 1 issue and be continued on its regular schedule thereafter.

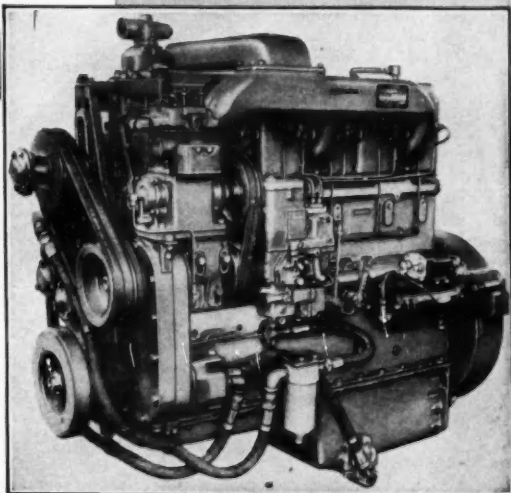
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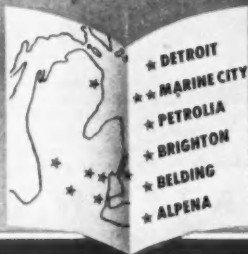
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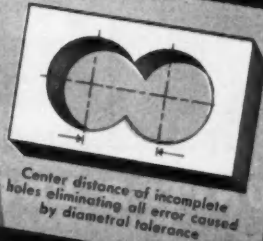
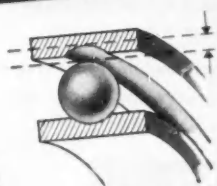
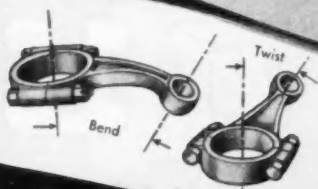
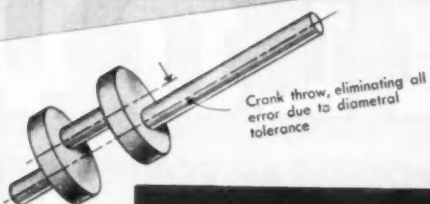
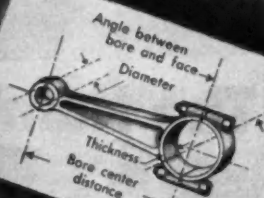
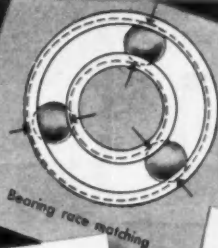
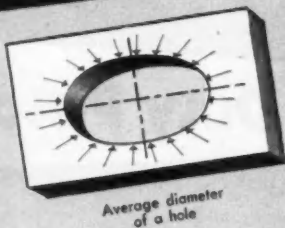
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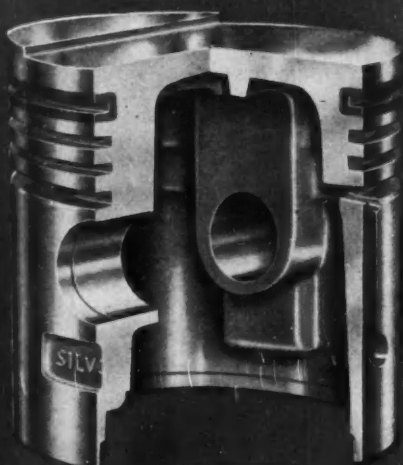
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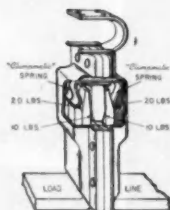
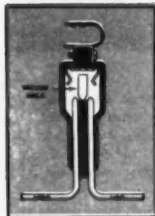
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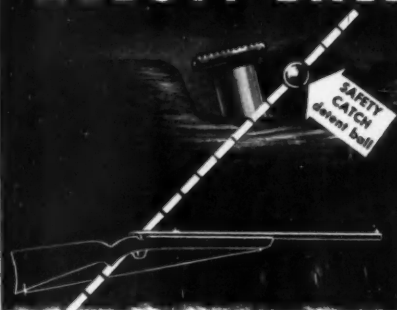
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See Page 3

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answers many questions that will lead you to better stripping procedures. You'll want to read more about:

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What strippers are best for removing oil-base paints? ... Synthetic enamels, alkali-resistant plastics or resin-based paints? ... Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? *See page 12.*

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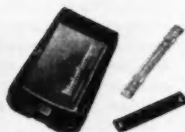
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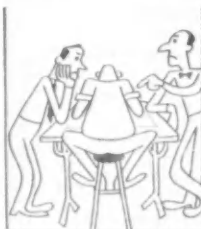
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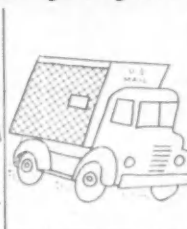
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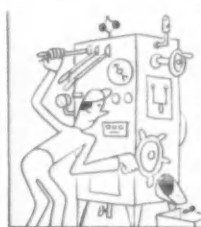
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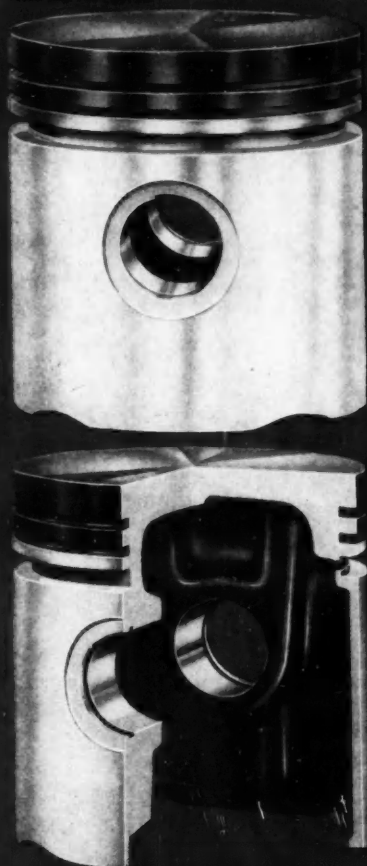
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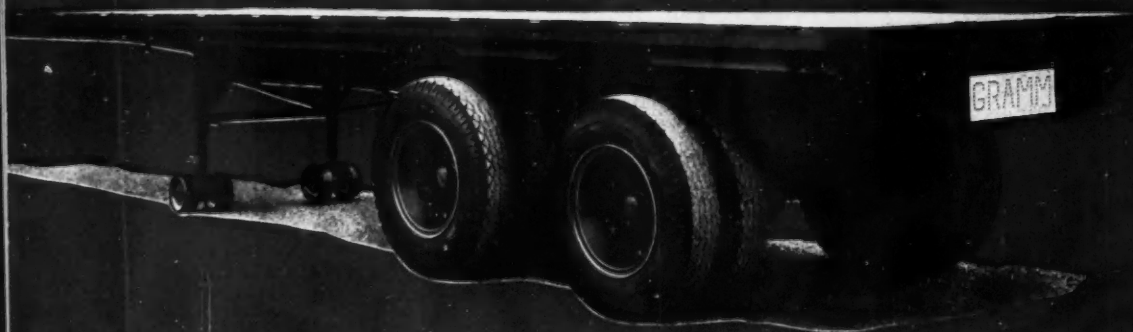
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